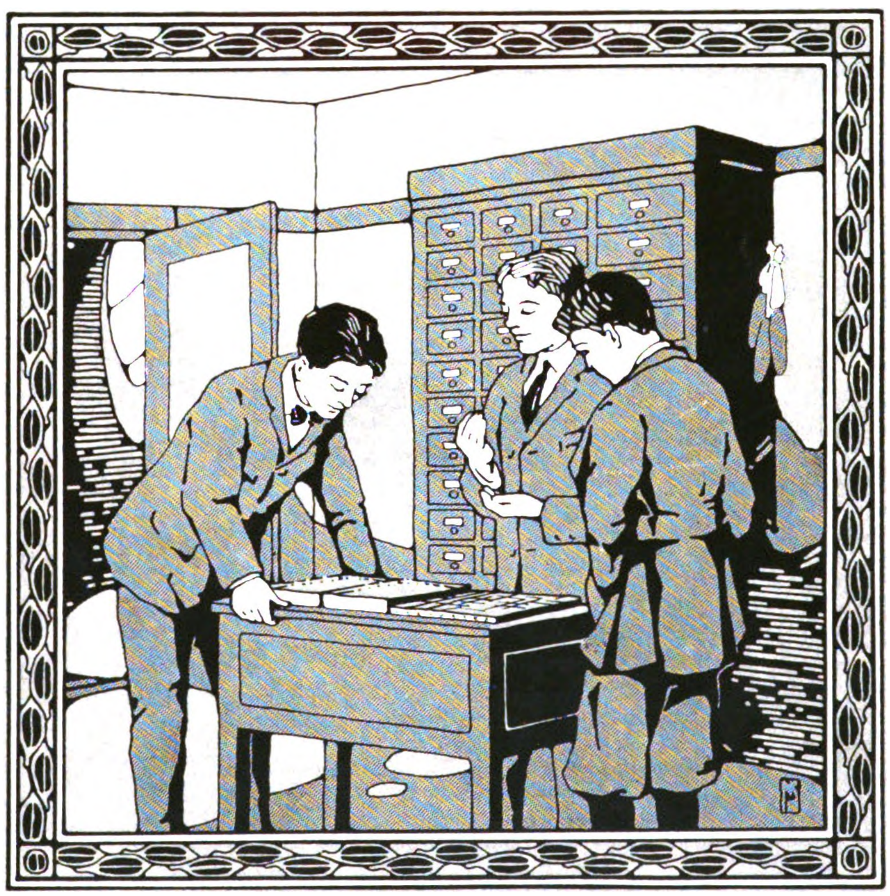
The Industrial-Arts Magazine



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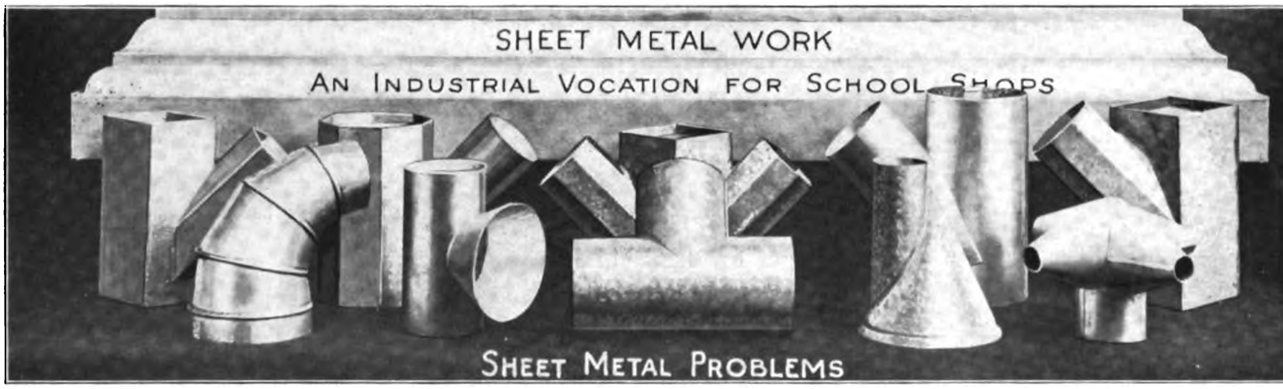

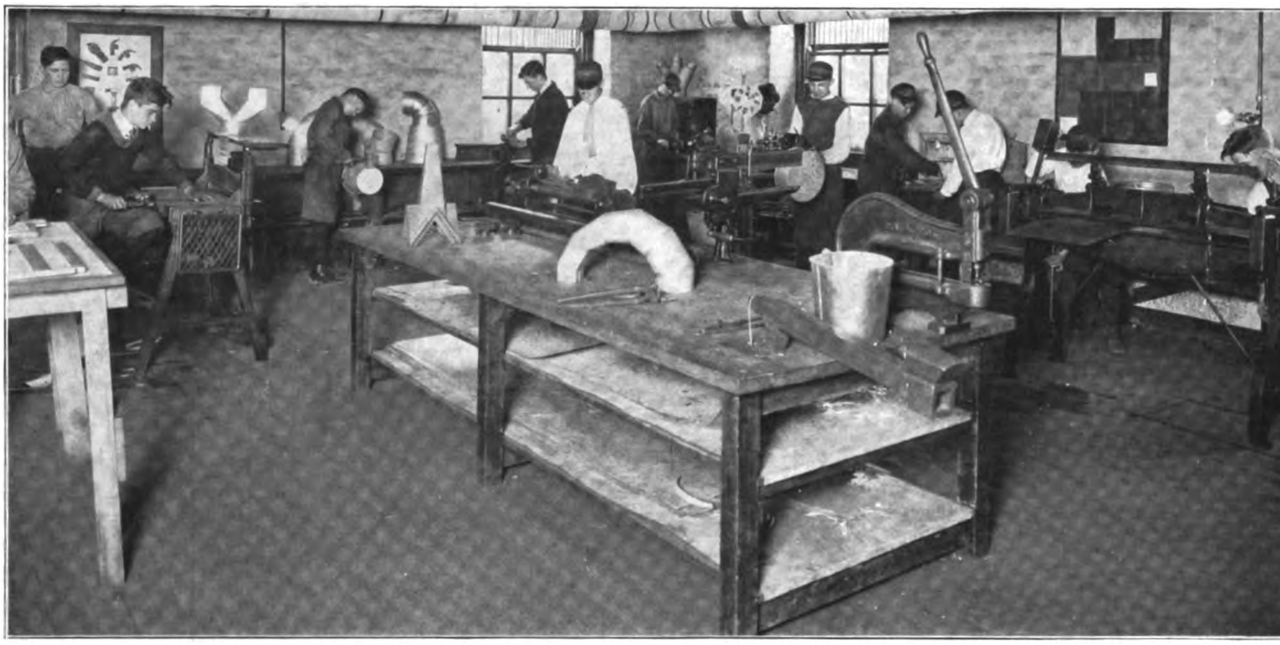

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INDUSTRIAL-ARTS MAGAZINE

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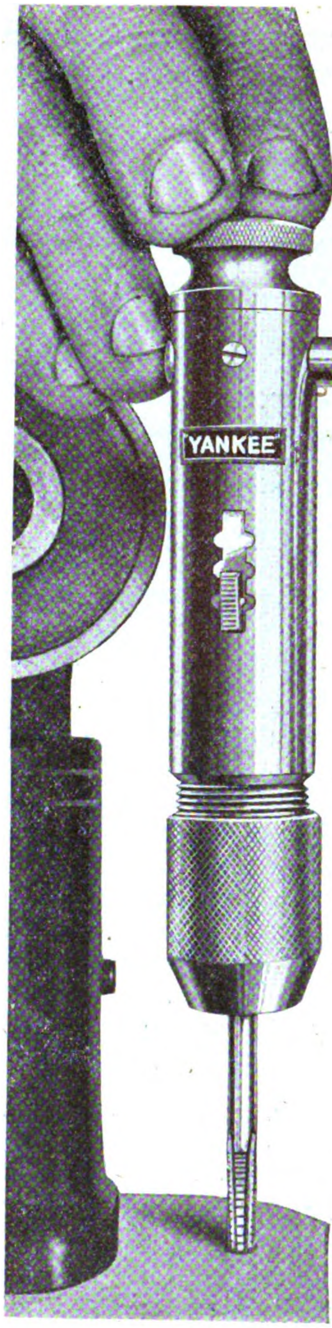

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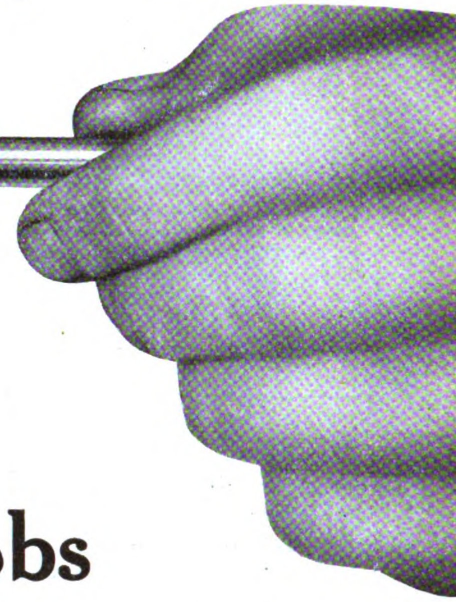

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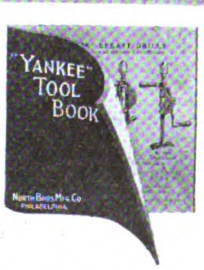

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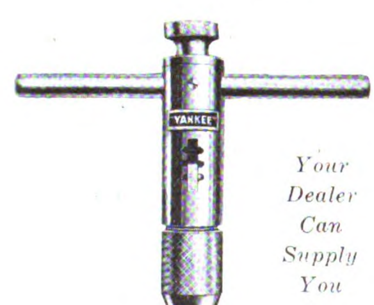

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INDUSTRIAL-ARTS MAGAZINE

Volume X JANUARY, 1921 Number 1

FIRST AID TO THE INEXPERIENCED—IX

PURPOSE, TERMINOLOGY, AND PSYCHOLOGICAL BASIS OF INDUSTRIAL WORK

S. J. Vaughn

A GREAT confusion seems still to exist in the terminology of vocational and industrial work and in those forms of work which are commonly regarded as preparatory or related to the field of vocational education. Manual training, industrial arts, practical arts, prevocational work and vocational education are used interchangeably by a great many people. Not only is there confusion in terminology, but there is far too much haziness with reference to the character of work to be expected in the various lines and with reference to the significance and bearing of such work in our educational philosophy.

Mere terminology is of itself not of overshadowing importance, but it is vastly important that teachers of special subjects shall have a common body of knowledge concerning such subjects and that they shall be able to make clear-cut and well defined distinctions, where distinctions exist, among the various phases of the work which these subjects cover. On the other hand, only confusion results when artificial distinctions are made where none exists. Endless discussions and misunderstandings and delays could have been avoided by the simple expediency of definition. Criticism could have been forestalled by illuminating statements of purpose.

Not long ago some visitors in a certain city were asked to visit a "trade school." The visitors went into the magnificent building with its elaborate equipment only to find some ordinary manual training work in progress. Not one of the students had any notion that he was pursuing courses which he proposed to follow as his life's work. No students were found who had even remote intentions of following trades. The teachers were conscious that the instruction being given did not lead in any adequate way to trade knowledge and skill; and furthermore, they were frankly of the opinion that the giving of trade courses under the conditions would be neither possible nor desirable. No claim is made, of course, that this is a typical situation. The case is cited to emphasize the point that lack of correct terminology leads to confusion.

Vocational and Industrial Education—Distinction.

In the very first place, a distinction should be made between vocational education and industrial education. Vocational education embraces every form of education and training whose controlling purpose is to fit for profitable employment. In its broad sense, therefore, it includes education for the professions, for commercial occupations, for agricultural pursuits, for home making, for trade and industrial work, etc. The very much narrower term, industrial education, may be used to designate vocational work in the trade and manufacturing fields, as well as all those various phases of educational work which make use of the materials, tools, and methods of industry for educational purposes, whether for general or specific ends.

As a general proposition it may be said that the character of industrial work (used as a general term like mathematics to cover a wide range of activities) is determined in any particular case by its purpose and the length of time at the disposal of the schools in which to accomplish such purpose.

The Three Avenues.

The purposes of the various phases of industrial work for educational ends rest, of course, upon psychological foundations. Reason is the distinctively human capacity. The animal jumps immediately and instinctively from impulse to action without the intervention of reason, without the cautioning influence of discrimination and judgment. The extent, therefore, to which reason intervenes between impulses and actions is both a guide and a measure for educational procedure. In general, non-technical language, it may be said that there are but three avenues from the realm of impressions, sensations, or impulses to the realm of action or conduct, namely, the avenue of instinct where the reaction is without reason; the avenue of the intellect and reason where the reaction follows definitely thought out conclusions; and the avenue of habitual or automatic responses.

The infantile or early childhood reactions are largely of the instinctive type. Such responses grow

into and blend with those of the second type which are initiated thru the avenue of intellect and reason. Once a reaction has occurred in response to reason, it tends thru repetition to eliminate reason and to fix itself as habit or automatic reaction. Thus the holding of a pen is at first a distressingly conscious and laborious effort. Later, however, as mere habit, the same act is performed with facility and comfort and with almost no appeal whatever to the reason or even to consciousness. This tendency of the mind to drop familiar reactions from consciousness and to relegate them to the realm of automatic responses makes possible the high degrees of skill so common in all the various fields of human effort. Thus it has been said, not quite accurately, that "skill is the vanishing point of education." Skill may be near the vanishing point of education in any particular reaction or control, but when this reaction has been given over to habit, the active mind tends immediately to busy itself with new problems and often to use the recently acquired habits to aid in the solution of the new problems. The same thing is true in all education. Every piece of knowledge or skill, the acquisition of which may be set up as a temporary end, when once acquired, becomes the means of attaining other ends.

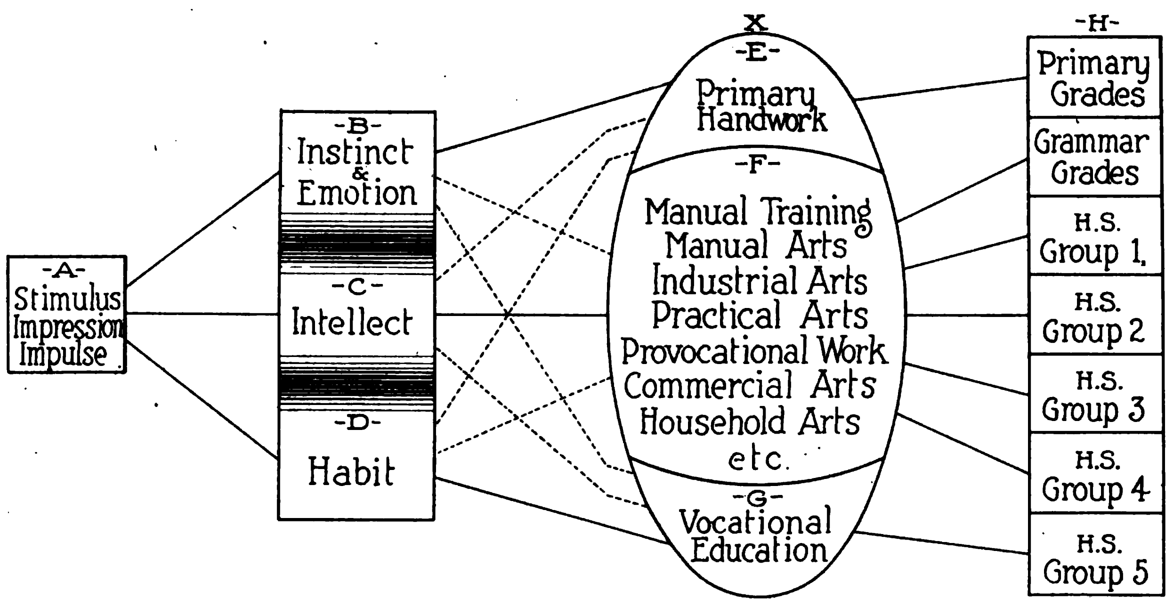


FIG. 1. PSYCHOLOGICAL BASIS AND RELATIONS OF MANUAL ARTS, INDUSTRIAL AND VOCATIONAL WORK.

Explanation of Diagram.

In Figure 1, an attempt has been made to express graphically the psychological basis and relations of the various forms of manual, industrial, and vocational work. It is manifestly impossible, of course, for the mind to be accurately diagrammed and to be divided off into well defined areas and realms with immutable boundaries. The diagram is offered, therefore, merely as an imperfect, mechanical device for the purpose of emphasizing certain relational ideas. Major relations are shown by solid lines. Minor relations, connections, or points of emphasis are shown by broken lines.

Every act has its origin in impulse, stimulus, or impression. *A* in Fig. 1 is the realm of impulse, stimulus, or impression. *B* is the realm of instinct, thru which lies the avenue from impression or stimulus to those immediate responses which Thorndike calls "unlearned." The third area, represented by *C*, is the realm of intellect, thought, reason, thru which lies the avenue from impulse to rational conduct—the seat of purpose, information, and knowledge of principles. *D* is the realm of habit, thru which runs the avenue from stimulus to automatic reaction. In addition to the specific skills designed for certain work and acquired by definite training, it contains the residue or by-product of realms *B* and *C*. That is to say that both instinctive and reasoned action may result in habit.

It will be noted that realm *C* shades off and merges into realm *B* on the one side and realm *D* on the other. In other words, an act may originate in instinct and yet be raised into the intellectual realm and consciously cultivated and finally in its improved form be dropped into the realm of habitual or automatic reactions. Or a reaction may be a deliberate and reasoned response belonging to realm *C*, but upon frequent repetition it requires less and less of conscious attention until finally it becomes almost a purely habitual performance belonging to realm *D*. Or by the deliberate act of the will an action which has become almost purely automatic may be raised again into consciousness, or realm *C*.

The large elliptical area X is the general field of action or conduct in so far as it is related to manual, industrial, and vocational activities. *E*, *F*, and *G* constitute the divisions of this general field of conduct. *E* includes those elementary activities of childhood which are grouped about instincts, such as curiosity, imitation, etc., which call to their aid in an ever enlarging degree, definite intellectual responses, and which gradually merge into types of work which have their origin and their completion in the intellectual realm. As the child advances, therefore, both in years and in experience, the realm of instinct recedes and the child

enters more fully into the realm of rational life where acts are inspired by conscious need or desire, controlled by purpose, and executed by reason.

F is the realm of reasoned responses and includes all forms of activities whose major emphasis is upon the intellectual phases of the work, and upon experiences guided by reason, with incidental manipulative skill as an important and necessary, but minor, consideration. Activities for general experiences and education, for contact with the materials and methods of industry to give an appreciation of the significance and problems of the industrial world, and for guidance purposes for future education and work—all such activities lie within realm *F*, as indicated in the illustration.

Area *G* is the realm of conduct which is thoroly grounded in habit—the realm of skillful performance.

Range of Motor Experiences.

It would be interesting to trace the total motor experiences of an individual from the early instinctive reactions thru the manual and industrial activities of the grammar and high schools to his completed training as a skilled tradesman. Such experiences begin with those instinctive reactions without plan or purpose, merging over rapidly into the realm of thought and purpose but still retaining a large element of physical experience and sense impression. They gradually rise thru the upper grades and high school to the point where the technical or theoretical phase dominate, where the practical manipulation of tools and materials assumes the character and function of the laboratory, and where manipulative effort is not confined to one particular line but is made to cover a moderately wide range of activities, such as machine shop practice, carpentry, forging, pattern making, etc.

Beyond this point, the vocational motive dominates. The field is narrowed to the one trade or pursuit which the student wishes to follow. The controlling purpose of the work becomes the immediate fitting of the student for useful or profitable employment in a recognized occupation. Specialized manipulative skill takes on a new significance and receives the major emphasis.

Thus it is that the motor experiences of such an individual as described above begin in the realm of instinct and end in the realm of habit, running the whole gamut of intellectual control from a minimum thru the maxium back to the minimum again.

It must not be assumed from this discussion that vocational work requires no intelligence or that industrial arts work requires no skill. The whole question is a matter of emphasis and purpose as related to shop work and the shop methods of procedure.

Manual Training and Industrial Arts Not Vocational.

All are agreed now that manual training, manual arts, industrial arts, practical arts, etc., which begin in the elementary grades and continue thru high school, or at least thru two years of it, have not, in the main, produced definitely vocational skill. Indeed, no such purpose has ever been held by any considerable percentage of those who have had either the administration or the teaching of these subjects. True, the early teachers of manual training and some of the later ones looked upon skill of hand as the main end of the work, but they did not conceive it to be training for definite vocations. They held to the doctrine of the transfer of skills and hence laid great store by the acquisition of skill of hand, but they had no notion that the making of carpenters and machinists and blacksmiths was the primary purpose of their work.

Even if the contention had been made that the purpose of manual training was to produce skilled mechanics, there were numerous reasons why such an ambition could not possibly have been realized. In the first place, not a sufficient amount of time has been allowed for the shop work to make possible the attainment of vocational standards. In the second place, the character of the work has not been such as to train for definite vocations. And in the third place, the teachers themselves have not usually had sufficient trade experience to enable them to give the work a distinctly vocational character.

The school people, therefore, have quite consistently disclaimed any intention of teaching vocations in the manual training, manual arts, industrial arts, and practical arts classes. The general public, however, has been quite uniformly impressed with the students' ability " to make things," the not infrequent instances of manual training boys engaging successfully in pursuits requiring more or less skill, and with the quite common belief on the part of the boys that they were getting training which would be commercially valuable. The public mind has thus far not been made conscious of its own inconsistency in expecting a few hours per month for two or three years in the manual training shops to make tradesmen of young boys, when the same boys take grammar and arithmetic and spelling and penmanship five times a week for many more years than they take manual training, without exciting anybody's expectation or even suspicion that they know very much about them or that they can use them with facility.

Groups of High School Students.

Having thus classified the various phases of industrial, or handwork, with reference to the mental significance of the activities involved, let us now inquire as to the various groups of pupils that may be found in the high schools and as to the value and kinds of industrial work which fits their purposes. What are their particular ambitions, their needs, and the kinds of industrial work adapted to their ambitions and their needs?

In the average American high school, the following groups of pupils are quite clearly discernible, especially among the boys. Among the girls there are other groups more or less clearly defined. It is not here contended that these groups constitute a fixed classification.

Indeed there are constantly occurring changes from one group to another. There undoubtedly are students who do not fit clearly into any one group, but in the main these five groups would seem to include almost the total high school population. Fig. 1, *II*, shows the various groups of the school field and their relations to the general realm of activities, or conduct.

Group 1. Those students who are pursuing "college preparatory" courses with the intention of entering colleges of liberal arts and science, or colleges of law, medicine, theology, etc.

Group 2. Those students who are planning to enter other professional colleges like mechanical engineering or architecture.

Group 3. Those students who propose to enter trade or industrial work but who have not made up their minds what particular trades to follow. This group will, in all probability, drop out before finishing high school.

Group 4. Those who have made no plans and who, consequently, are wholly at sea as to their future work.

Group 5. Those students who have definitely decided to enter certain trades as soon as they are permitted to leave school and who desire all the training they can get in early preparation for such trades.

Types of Industrial Work for Various Groups.

With Group 1, the vocational motive is very remote, even if it is at all defined. This is the traditional group, the typical "classical high school" group. It is perfectly apparent, therefore, that the students of Group 1 will not enter the ordinary manipulative phases of vocational work, and hence will have no direct need for definite manipulative skill, except in so far as such skill might be an aid to appreciation in various fields with which they must come in contact. But from the broadly democratic and social point of view, Group 1 are probably in as great need of at least a casual contact with industrial, commercial, and agricultural phases of education as any other group.

These people must live in a society with other and much larger groups whose absorbing ideas and interests are in the industrial fields. According to Dr. Dewey, two of the fundamental necessities in a democratic society are, first, for the various groups to possess a fund of ideas in common; and, second, for the groups to maintain avenues for the spread of ideas from one group to another. Furthermore, such people as constitute Group 1 must build houses, employ labor, buy furniture, pictures, tapestries, and other products of industry, and come in contact in various and sundry ways with the trade, commercial, and industrial world. Reasonable preparation for such contact could be acquired by pursuing high school courses in the practical lines of commercial, agricultural, household, and industrial arts. Such courses involve a maximum amount of industrial knowledge combined with concrete experiences which furnish a basis for appreciation and which result in a degree of manipulative skill. In such an instance, therefore, the skill acquired would be incidental—a necessary result of certain information tested in the laboratory of experience. This type of work would fall clearly in the intellectual realm *C*, and would be pursued for purposes of intelligent consumption and of appreciation of problems, conditions, methods, and products of industry, commerce, agriculture, homemaking, etc.

In the case of the second group, the professional vocation, such as electrical engineering or architecture, has been definitely decided upon. For such students there would still seem to be but scant reason for attempting to produce a high degree of manipulative skill in their high school shop work. As high a degree of skill as can be produced in the time devoted to purely manipulative processes should be produced; but the time devoted to such work should be relatively small. Certain it is that the skill thus acquired by such students is never used in the tradesman sense.

The demand would still be in this group, as in the first group, for intelligent consumption, for appreciation, type experience, in both manipulation and organization, and a limited amount of manipulative skill for purposes of the future college courses, with the added element of greater technical knowledge and understanding. Thus the shops for the manipulative work would be recognized as laboratories wherein demonstrations and experimentations are carried on in illustration of the technical principles formulated and studied in the theoretical, or technical, phases of the work. It would therefore seem that a considerable proportion of the time now spent in tool and machine manipulation in the technical high schools in an attempt to acquire mere manipulative technique, might to a much greater advantage be devoted to something else.

Those who constitute Group 3, or those who must at an early date go to work in some vocation, but who do not know what line they wish to select, much less the line of work in which they might find some chance of success, are entitled to definite and positive and intensive assistance from the schools. They might at least expect to receive some guidance and advice in selecting an occupation and a modicum of training in the direction of that occupation. Such aid should be offered in a group of "finding" courses, which have been loosely and inappropriately called "prevocational." I have always had a quarrel with the term "prevocational" because of its all-inclusive indefiniteness. *Provocational* —"a call to" the vocations—would be meaningful and exact in designating those finding courses whose purpose is to acquaint the student with the general character of several different vocations and to aid in the selection of one to follow.

In the early part of the high school, or in the junior high school, therefore, such students as those mentioned in Group 3 can do no better than to pursue

for a part of their work, brief courses in the technical content and practice of such important vocations as carpentry, electrical work, machine shop practice, printing, office practice, drafting, etc.

Since the finding, or provocational, courses are for guidance purposes, and cannot in any event lead to more than one occupation for an individual, and conceivably to no occupation for some individuals, it is but reasonable that the emphasis should be placed on the informational, or technical content side, with but moderate stress on the accumulation of definite skill in the several occupations. Therefore, this type of work, like that of the two preceding groups, belongs to the *C* realm of Fig. 1, with its major emphasis on the intellectual content and experiences, and with but relatively minor attention to manipulative skill. However, the manipulative phase of the work should be emphasized more in the same length of time in the provocational courses for Group 3 than in the work for Groups 1 and 2. Such courses may, furthermore, demand a different organization from that of the other groups.

Those students who belong to the "don't know," or the wholly undecided Group 4, can do no better than to follow the same procedure marked out for those in Group 3. By taking the finding, or provocational, courses of the junior high school, they either discover something that enlists their interest, or they definitely eliminate the entire trade group of occupations from consideration and turn their attention toward the professional fields. In such cases, however, the provocational courses would not only have served the purposes of guidance, but they would likewise have given the students that fund of general information and types of experience that are as valuable from the standpoint of general education as any other work which the high school offers. It is a common occurrence in these courses for students to develop such interests as will lead them to shift to such other courses as will prepare them for liberal arts or engineering colleges.

Group 5 have definitely determined upon certain vocations which they propose to enter as early as possible. They desire, therefore, to take such training as the high school offers in preparation for such work as carpentry, printing, or automobile repairing. In this case, the problem is a perfectly definite one. They demand the maximum of marketable skill in a minimum of time. The conditions are fixed. The students are going to leave school in a certain length of time. They are going into definite wage-earning occupations. They ask the schools to furnish them specific preparation. Whether it is right or wrong, wise or unwise, the law provides for such training. The major emphasis of such training is upon the manipulative phases of the work in acquiring as large a degree as possible of the tradesman's skill. Such an emphasis, therefore, places this type of work in realm *D*, Fig. 1, or the realm of habitual reactions.

When, thru the pressure of necessity or otherwise, one determines to enter with a minimum of preparation into a wage-earning occupation, the greatest stress will insure the largest entrance wage. This does not eliminate or ignore, or even underestimate the value of the technical or related subjects phase so esential to the individual and to the proper performance of his work. Neither does it imply that vocational work requires but little thought or reason. It simply means that in preparation for early entrance into a vocation, the major consideration is attention to certain definite, standard processes which by repetition become fixed in habit and thus leave the intellect comparatively free to deal with other matters, especially those that are intimately related to the processes whose mastery has been acquired.

Restricted Meaning of Vocational Education.

I have here used the term vocational education in its narrow sense in which it must be conceived for training purposes, namely, specific preparation for profitable employment. Ultimately, however, vocational education must compass all those activities, conditions, aptitudes, and accomplishments which contribute in any way to one's vocational efficiency. A worker's home surroundings and conditions might, and frequently do, materially alter his efficiency quite apart from considerations of definite vocational knowledge and skill. Certain extraneous habits or peculiarities of temperament and conduct often totally unfit highly intelligent and skilled workmen for the work for which they were trained. Vocational education, therefore, properly conceived, does not restrict itself to a minor segment of life, but should and must become an integral and vital part of the worker's life, about which all other activities and accomplishments will gather.

Purpose and Terminology of Non-Vocational Work.

Changes in terminology have not always by any means indicated changes in the content or character of the work which the terms were supposed to designate. In some cases, new terms have simply been attempts to improve upon the preceding ones in describing a little more accurately the work under consideration. In the whole realm of work that has come into the schools in the last forty years under the various names of manual training, industrial arts, vocational education, etc., there may be said to be not more than three fundamental, underlying ideas. These have eventually found expression in the types of work offered for the following three purposes:

1. Such shop work as will supply thru motor activities and concrete experiences a much needed element in general education, without regard to the future occupations of the pupils.

2. Work that will provide instruction and typical experiences in a variety of occupations, for purposes of guidance toward future work. It may very seriously be questioned whether this work need be essentially different from 1, except perhaps in point of organization.

3. Definite vocational preparation.

Manual training, manual arts, practical arts, and industrial arts are terms which have all been used to designate the work offered under the first purpose mentioned above.

Manual training was the original term under which the work was introduced in this country. It was an all-inclusive term used to designate any sort of hand training. All kinds of machinery were strictly taboo in the early days. Since this new education involved physical effort not demanded by any other sort of school work, it naturally became known by this characteristic and hence took its name from the form rather than from the content of the work. And, as a matter of fact, this name described rather accurately the early purpose and efforts in this new field. By right of priority, and of acquired significance, it is still in good standing as indicating the shop work in elementary and high schools designed for general educational purposes.

Manual arts, as a name, came into use as a substitute for *Manual training.* While it may not describe accurately the work which it was used to designate, its very introduction was evidence that the former term was too narrow to be descriptive. The term *manual arts* is an attempt to fit the name to the *content* rather than the *form* of the work. It indicates that those who brought it forward were thinking in terms of the ideas, materials, and practices of at least some of those trades, vocations, or "arts" in which people use the skill of their hands to do the work of the world. It is a perfectly definite recognition of the fact that the work thus attempted to be described belonged to the intellectual, or C realm, as shown in Fig. 1.

Practical arts is the term used quite generally thruout the eastern states to designate all those non-vocational lines of work for both boys and girls whose purpose is to give those contacts and experiences with the practical work of the world which are demanded by the ideals of general education. The term *practical arts,* therefore, includes industrial arts, agricultural arts, commercial arts, household arts, etc.

Industrial arts represents simply another attempt to name more appropriately the work which has been growing and enriching and broadening under the old names of *manual training* and *manual arts.* It broadens the conception of the work, in that it comprehends a great variety of activities that give insight and appreciation concerning all those "arts" that industry employs to do the work and produce the goods of the world. Like manual training, industrial arts may give a certain incidental skill unable in vocations, but this is not its purpose. Hence, the work shown as *industrial arts* includes the hand work and manual training of the elementary school and all those shop activities of the high school which constitute a part of a well-rounded course for general educational purposes, and not designed to prepare students for useful employment in recognized vocations.

Prevocational, or Provocational, work consists of such "try-out," or "finding," or "fore-taste" courses in a variety of vocations as will give a sufficient knowledge and experience upon which to base an intelligent choice of future vocation. Of course, all *industrial arts* work should, in a sense, result in such information and experience as would serve as a basis for judgment with reference to future occupations. Whether by organization and emphasis, general industrial arts courses may serve for the prevocational work demanded for certain special groups, especially in continuation classes, has not yet been fully determined. It seems probable, however, that the necessary brevity of *finding courses* and the rather definite decision on the part of prevocational students to follow *some* trade, demand a separately *organized* and conducted system of work. At any rate, the mass of information and experiences gained in the various try-out courses is equivalent, in all intents and purposes, to an equal amount of general educational work. Hence, all the try-out, or finding, work belongs to realm C where the emphasis is on intellectual content.

There was a time when the teachers of manual training, manual arts, industrial arts, etc., felt that their work was under suspicion and attack because it was not called vocational. Indeed, some such teachers adopted the vocational terminology in speaking of their work. Questions were seriously asked whether the development of vocational courses would not inevitably destroy those earlier, non-vocational courses.

When the matter is fully understood, it will be found that there is a definite and indispensable place in the educational program for all the various types of work which have been developed under these various names. The ideal arrangement will fit them into an organized scheme so that each type will play its perfectly definite and essential part in this supreme task of making education both democratic and universal.

EVEN if we accept the purely material viewpoint, a nation can ill afford to ignore the money value of an Art education which is a natural element of our industrial life. We must, in the near future, not only supply ourselves with textiles, furniture, carpets, wall papers, clothes and other necessities formerly furnished by Europe, but we shall, in many instances, be asked to supply South America, and even Europe itself, with these things. In matters of natural resources, mechanical skill and physical energy, we are ready. In matters of Art, we are crude, uncertain, and, worst of all, in many instances satisfied. Until there is a changed attitude as to what Art is, we cannot compete even in matters of commercial rivalry, for Art is as essential to man's perfect satisfaction as any material quality can be.—Frank Alvah Parsons.

THE CLASS PROJECT IN DESIGN—I

Edward J. Lake, Professor of Art and Design, University of Illinois

IN THE attempt to cultivate skill and judgment thru the study of design, as applied to the crafts and industries, the teacher must choose projects or problems that are possible with the class and which develop the ingenuity and ability of each member of the class.

Design is the arrangement of materials to serve a purpose. To design in a material, the pupil must know the peculiar limitations and possibilities of the material as adapted to the purpose.

No one teacher can teach design in many different materials or forms of construction, because no one teacher can acquire the experience peculiar to many different crafts and industries, but a teacher who is trained in the judgment of effects and, to a limited extent, in the handling of materials can devise and use projects that will give a valuable experience to the members of a class.

Projects which require as little ability in drawing or craftsmanship as any are the composition of forms in two tones of paper and ink, suitable for reproduction. There are many such projects, as initial letters, monograms, titles, letter-heads, tail-pieces, announcements, posters, etc. The one requirement for reproduction is that the inked areas, spots or lines be clear, definite, and in scale with the whole design, so that when reduced by photography and etched on a block, no parts of the design will be lost.

Such projects are desirable as class problems because they can be made the means of acquiring experience in the judgment of effects under definite conditions. One such project has been carried on with some degree of success, as indicated by the variety of results shown. These initials are a few of many such produced by a large class of students in college, who had little ability in drawing or painting. They were not prospective commercial designers or prospective designers of any sort, but were making a study of effects in design as a matter of appreciation. The same project could be offered with equal success to a high school class.

The materials used in this and similar projects were:

1. A block of paper 9″ x 12″ on which a T-square and triangles could be used.
2. A small T-square and triangles suitable for use on the block.
3. A lead pencil of H. B. grade and eraser.
4. Sheets of tracing paper 9″ x 12″.
5. A small tube of paste.
6. A bottle of India ink.
7. A Japanese brush.

The specifications for this problem were:

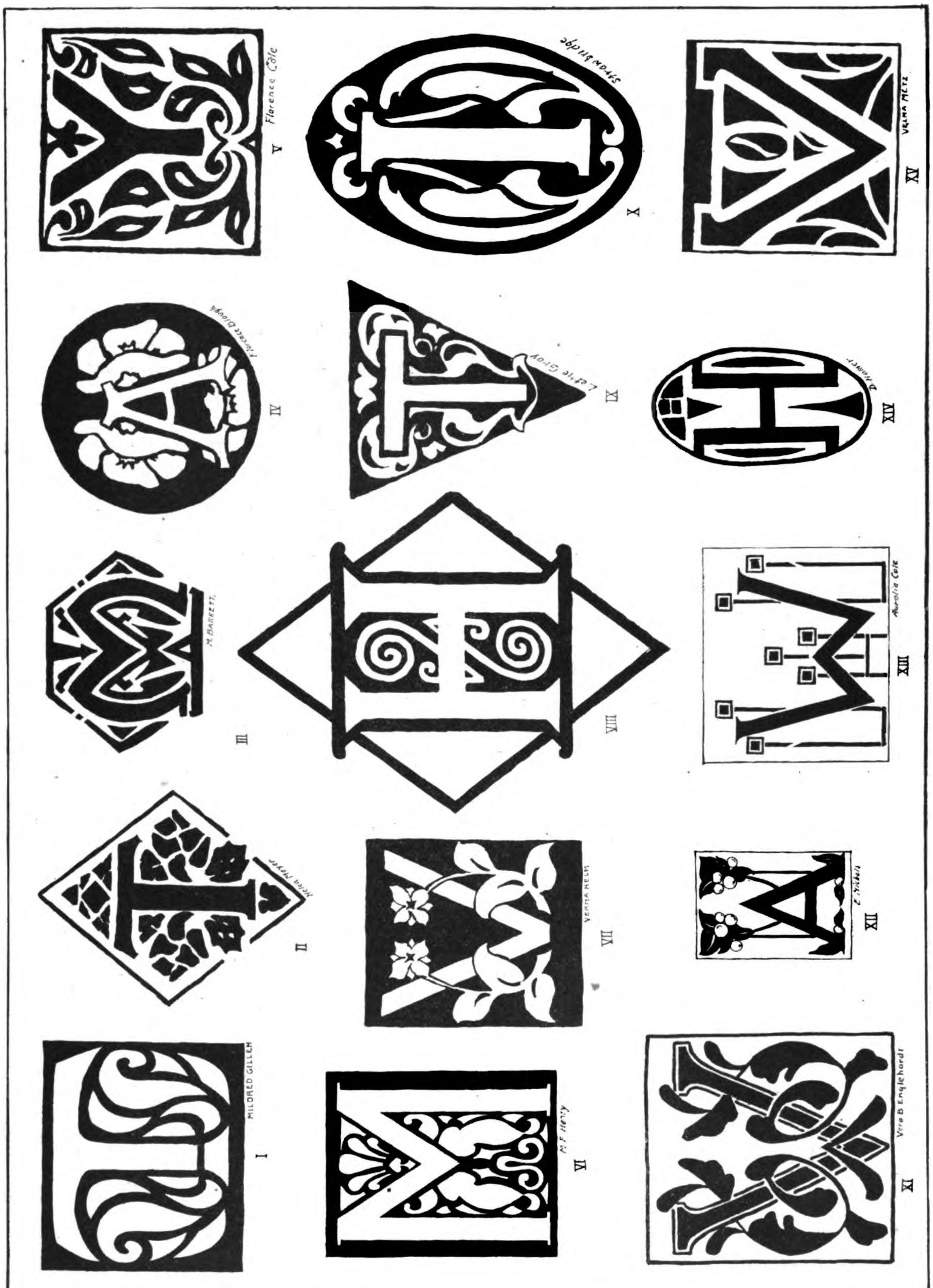
1. Place within a geometrical shape as a circle, square, rectangle, triangle, polygon or oval, one of the bisymmetric letters, as A, H, I, M, O, T, U, V, W, X, Y.
2. Apply to the letter and the enclosure any suitable decoration that will make of the design a most attractive initial letter *which is in symmetry over the vertical axis.*
3. Trace the final design with a brush and ink on a sheet of tracing paper which is mounted over the penciled study with a touch of paste at each corner.
4. Post the design for class inspection.

In a discussion of the best way to go about the problem the teacher was careful to suggest and not dictate the composition. Methods of executing symmetrical designs by folding paper on the vertical axis were shown. The method of holding a small square mirror on edge over the vertical axis and noting the effect of symmetry at different angles and positions of the mirror was also shown. Preliminary study of the composition in pencil was insisted upon. Various schemes were tried out by each pupil. Various decorative forms, such as flowers, sprays of leaves, geometrical and historical units were made available to the class for selection and adaptation.

It was emphasized that a literal drawing of a natural form is not desirable for decorative use. Conventional treatment of a natural form may be without interest. Nature offers many suggestions in line, form, tone, and color, but the designer must select for a purpose from these natural offerings. That design is most successful in which there is a place for every unit and every unit is in its place to the purpose. Balance is secured in this design by symmetry. Rhythm, or the transfer of interest, must be secured by arrangement of the units. Harmony of the units is essential, but variety is also necessary to interest.

The project offers the problem of adjusting the decorative units so that they will have something in common with the letter and the enclosure. Parts that are common with the letter and the enclosure are the vertical axis, the diagonals, and the corners of the enclosure. Note how in the examples shown the ornament unites the letter and enclosure by interests common to both. In numbers I, II, III, VI, IX, X, and XII the ornamentation radiates from the vertical axis and conforms in shape to the enclosure.

In numbers V and XV the ornament radiates from two corners of the enclosure and from the vertical axis. Perhaps the most unique design of the collection is number XIII, in which the ornament is in lines and forms similar to the enclosing rectangle, except that they are arranged to pronounce the upper extremities of the



DESIGNS MADE BY THE AUTHOR'S STUDENTS IN WORKING OUT PROBLEM.

letter. Number XIV is also a unique and simple design which harmonizes a rectangular letter with an oval enclosure by forms that have the curved and rectangular character of each.

In numbers VII and XI the ornamental is related to the letter by opposition of line and to the enclosure by conformity with the sides, and to both by symmetry over the vertical axis.

Perhaps the best general results of such a project is to lead the members of a class to the realization that beauty and propriety of design do not depend on using natural forms, but on the careful arrangement of lines, shapes, spots, and tones to give unity of effect with variety of interest.

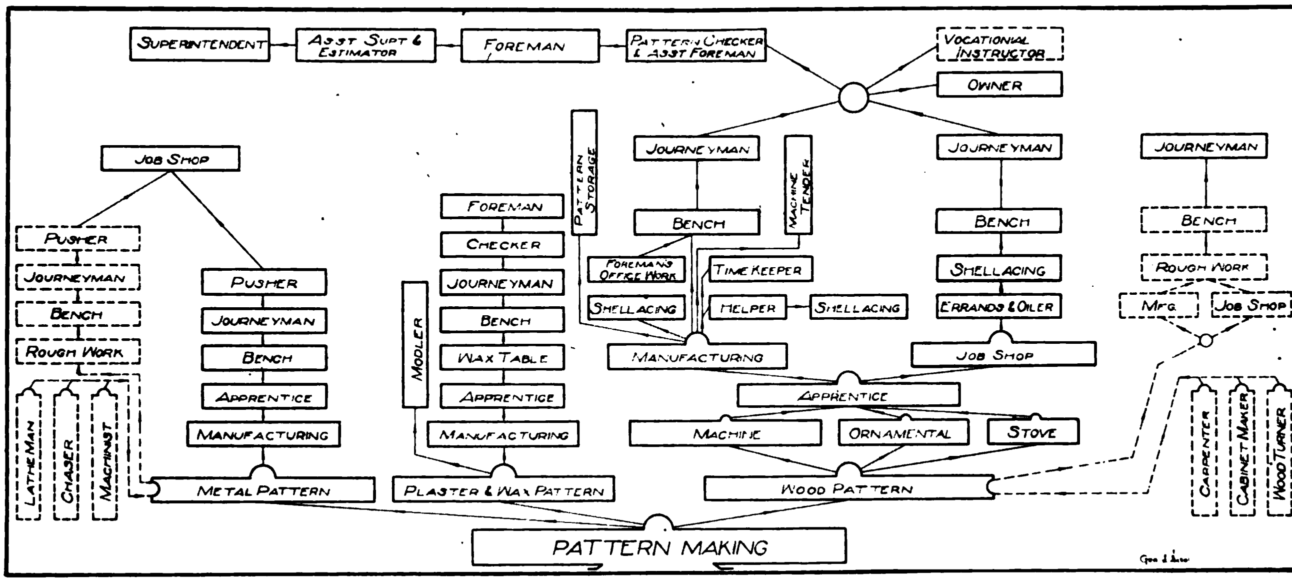


FIG. 1.

Graphic Aids in Vocational Teaching Analysis

Clyde A. Bowman, Director Department of Industrial Arts,
the Stout Institute, Menomonie, Wisconsin

THE CONTINUOUS problem of the teacher, especially the vocational teacher, is the selection and teaching of parts of the trade or subject, i. e., to select and teach *less than the total trade or subject.* This selection is based on the kind of pupils, the kind of classes, the demands of the working environment of the pupils, and the possibilities of the leisure environment, etc.

The test of the professional skill of the teacher rests on his *clarity of vision* relative to the total possibilities of the trade or subject he is teaching, and skill and accuracy in the *selection and teaching* of that part of the total in the subject or trade, which the present particular group needs most. The teacher's professional skill is accordingly made up of three large factors: analysis, selection, and teaching. If any one of the three is lacking there is a corresponding drop in the professional skill. The training of new teachers, and the improvement of teachers in service, accordingly calls for aid and guidance in the factor or factors of the three in which the teacher is weakest. The trade or subject analysis should, in producing results, throw light on the selection. The selection, in producing results, should in turn throw light on the teaching. If any one of the three is allowed to go off on a tangent the other two are affected. The teacher's continuous use of the results of subject and trade analysis is in selection. This selection is of parts of trade or subject content for particular classes or individuals, particular time allotments, particular equipment allowances, etc. It is more difficult for a person of broad experience in a given field to select and teach only a part of the total than it is to teach the total.

The major study of the vocational teacher in training is learning to teach. Following the "project method" as indicated in Bulletin No. 52, of the Federal Board for Vocational Education, this becomes his major subject, made up of the three elements as mentioned. As the institution designated by the Wisconsin State Board for Vocational Education for the training of trades and industries vocational teachers, the Stout Institute, Menomonie, Wisconsin, has a group of men taken directly from the trades under the direction of the Board for a two-year intensive teacher training course. In this article are indicated the steps they have taken and are taking in their analysis of the trades which they will teach, in the selection of what to teach from the results of this analysis, and its bearing on teaching.

Machinists, toolmakers, sheet metal workers, automobile mechanics, carpenters, machine woodworkers, and cabinet makers were represented in the first group in this teacher-training work. Each one early in his trade analysis saw what had been left out of his trade experience as he secured his apprentice training and journeyman experience in modern industry and asked for further shop training and experience in his trade *which presumably he had* when he came. This was immediately given him.

Formerly a "trade" meant that group of skills, information, and judgment possessed by a skilled workman in production or maintenance meeting some phase of the needs and demands of society. This meant in the early days a breadth of skill in the possession of each workman in a given trade sufficient to make the complete single item of production of the particular trade. "Trade" and "occupation" were synonymous. In the trend in industrial organization which brings us up to and into the present we find "trade" retained as a name,

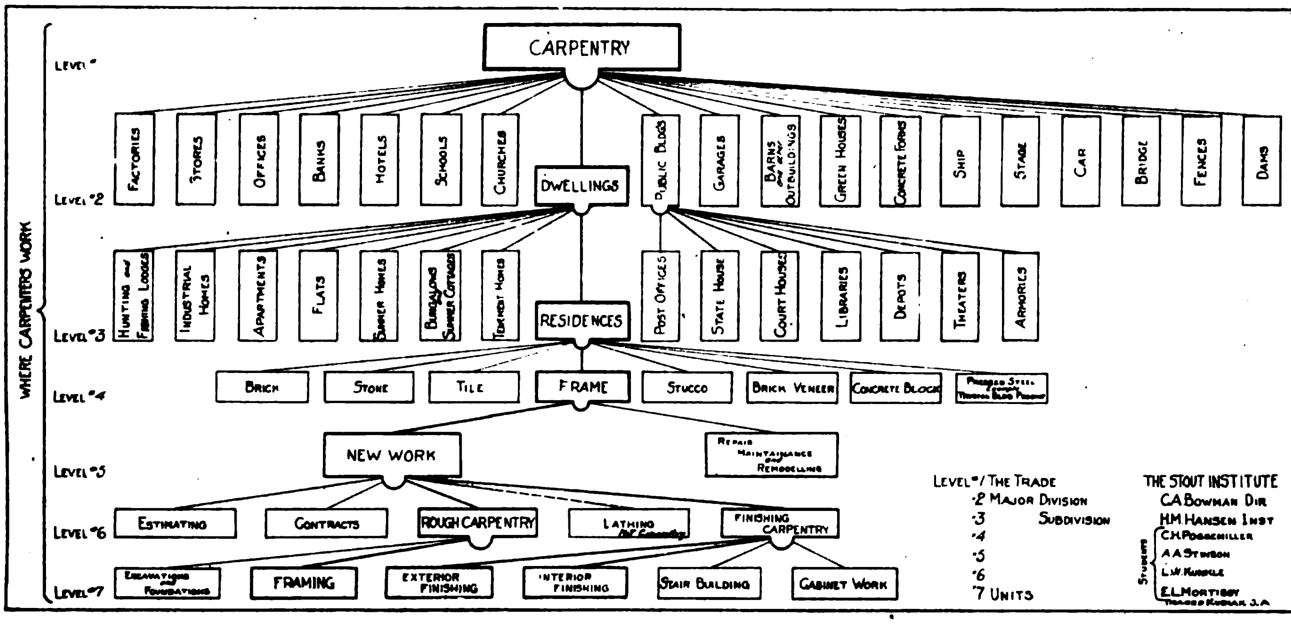


FIG. 2.

but as far as the individual is concerned it is the name of a group of occupations. In the carrying out of the work of the trade a number of individuals are involved. Each individual earns his living at an occupation which is one of a group of occupations which together may be called a trade. For the vocational teacher to be prepared to teach units of *trade* work as called for in part time and evening vocational school work, if he is to teach *any* units in his *trade*, he must know and be able to do the work of several "occupations." He will *know* and will be able to *do* more than is usually called for and paid for in an occupation in his trade.

The Instructor, the Man, and the Job by Allen, is used as the reference text in their trade-analysis work and is the basis for their data sheets. The data is arranged for use as indicated in Bulletin No. 52, of the Federal Board for Vocational Education, for the "project method." The writer gives direct acknowledgement to the following members of the faculty of the Industrial Arts Department, the Stout Institute, for technical checking and aid in student direction in the analysis of their respective lines of work.

R. L. Welch, Instructor in Forging and Sheet Metal Work.

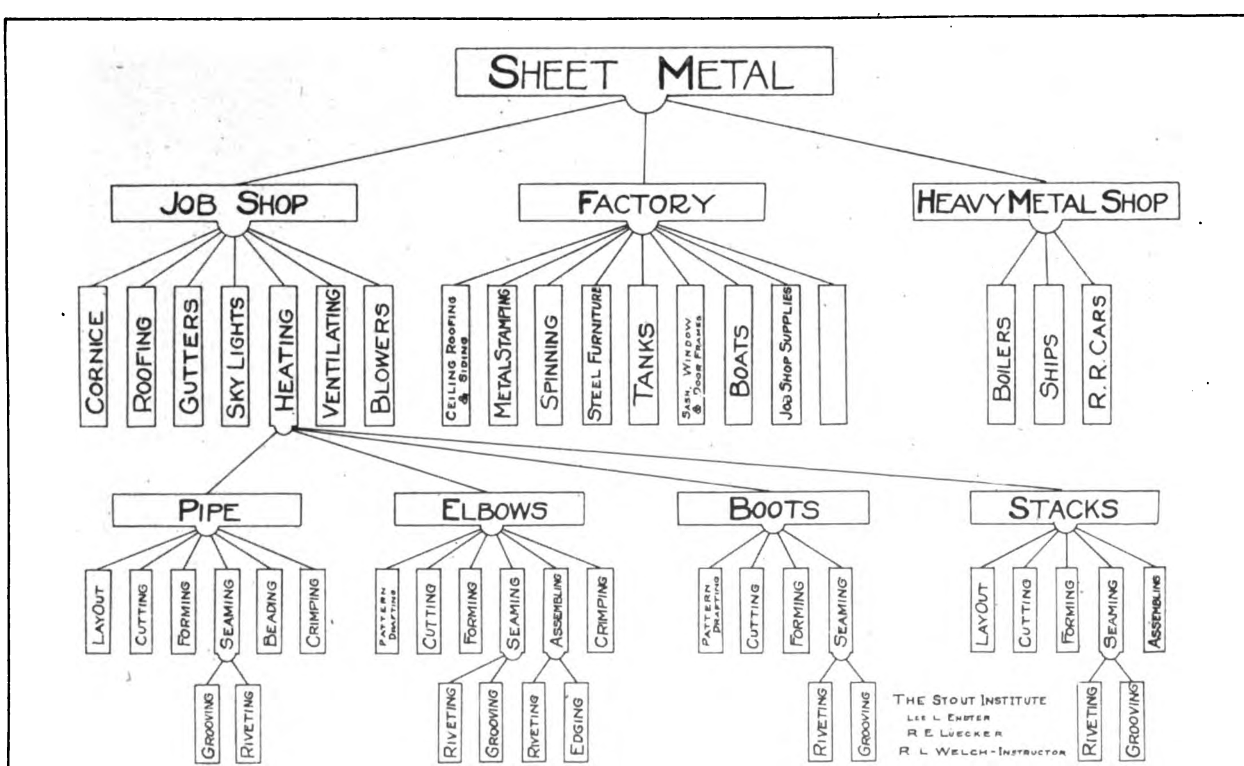


FIG. 3.

H. E. Milnes, Instructor in Pattern Making, Foundry, and Machine Shop.

H. M. Hansen, Instructor in Carpentry, Cabinet Making, and Millwork.

H. F. Good, Instructor in Auto Mechanics, and Electrical Work.

E. J. Neary, Instructor in Automobile Mechanics and Shop Mathematics.

J. E. Roy, Instructor in Bricklaying, Mechanical and Architectural Drawing.

The students in the Stout Institute, all journeymen in their trades, contributed work on the charts in their respective trades.

Pattern Making—George W. Nickel.

Carpentry—F. J. Finkbeiner, G. Mueller, W. L. Osmun.

Machine Shop—A. Weber, J. Herian, E. J. Couvillion, C. Strom.

Automobile Mechanics—Henry Houle, Ray F. Kranzusch.

Sheet Metal—Lee Endter.

In discussing and thinking on "trade analysis" there is sometimes an unconscious tendency to retain the meaning for the name "trade" which it carried formerly. In the analysis of present trades the vocational teacher training group at the Stout Institute began with a chart of *where people work* in the given trade. This uses the classifications based on what they do only so far as is necessary to show *where they work*. This chart will graphically indicate occupational fields. It will be used to focus analysis on and in certain occupational fields. It will be used to focus analysis on and in certain occupations as each is taken care of in the analysis of the total trade. The charts of Pattern Making (Fig. 1) and Carpentry (Fig. 2) are samples of charts of *where people work*.

In the chart of Pattern Making (Fig. 1) there are indicated the major divisions of the total field, metal pattern making, plaster and wax pattern making, and wood pattern making. These in turn are divided to show the fields *in which people work*, with some indication of probable travel from one field to another. Likewise in Carpentry (Fig. 2) the fields in which *people work* are indicated.

For the initial survey in starting analysis, selection is made of the probable work of an occupation. For example, from the pattern making chart the following line of occupational experience travel might be taken for analysis; pattern making,—wood patterns, machine—apprentice—manufacturing—then carrying the analysis thru both of the present avenues open, namely, the all-around training and the specialized training. These selections for analysis will usually approximate in breadth, the occupational experience possible and probable, for an individual in present industrial organization in the total group of occupations called a trade.

Following such an analysis and selection the chart of *what people do* is worked thru. The charts of Automobile Mechanics (Fig. 7), Sheet Metal (Fig. 3), Machine Shop (Fig. 4), Bricklaying (Fig. 5), and Carpentry (Fig. 6), are examples of charts of *what people do*. In these the classification is worked out around which the material accumulated in trade analysis, subject analysis, job analysis, and topic analysis is arranged for teaching use. The chart (or, in the case of subject and topic analysis, the outline) should indicate:

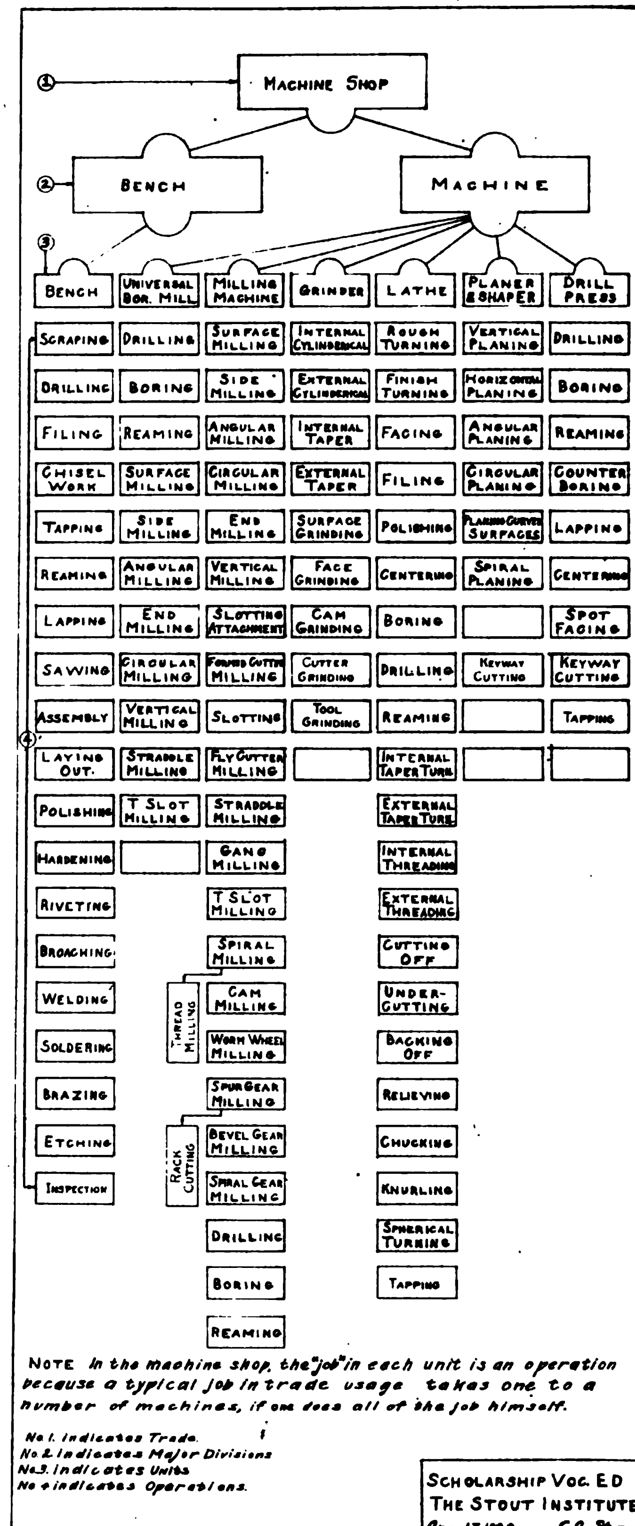


FIG. 4.

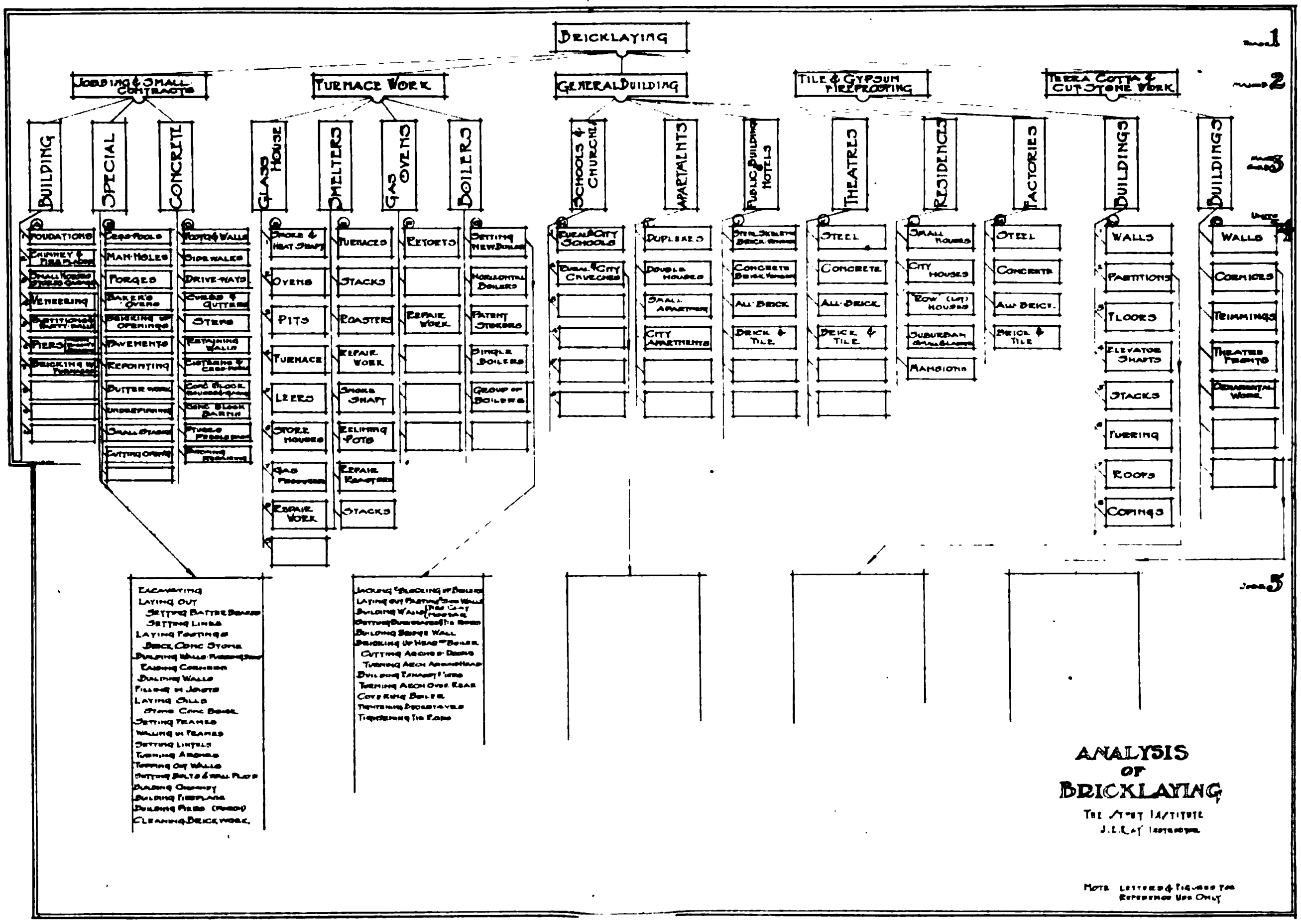


FIG. 5.

The major divisions of the subject or trade.

The major sub-divisions.

The level of sub-divisions which indicates the units (in trade analysis called "block" by Allen) in the field studied. A unit is that portion of the subject or trade in which the several parts to be studied and learned or done differ chiefly in difficulty rather than kind. Mastery of successive parts accordingly aids in mastery of the rest.

The level of sub-divisions which indicates the jobs or topics within the units.

The level of sub-divisions in and beyond which the elements are considered parts of some one of the topics or jobs and are not considered as jobs or topics of themselves.

The charts of "What People Do" in Sheet Metal, Bricklaying, Carpentry, Machine Shop, and Auto Mechanics are suggestive of the graphic analysis used as a

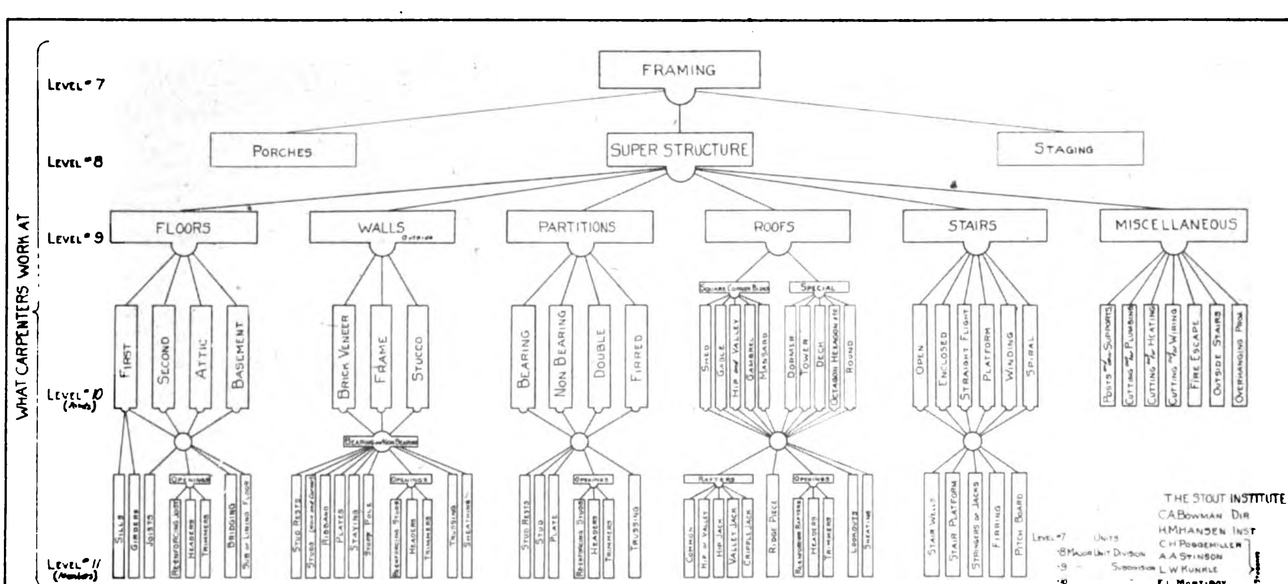


FIG. 6.

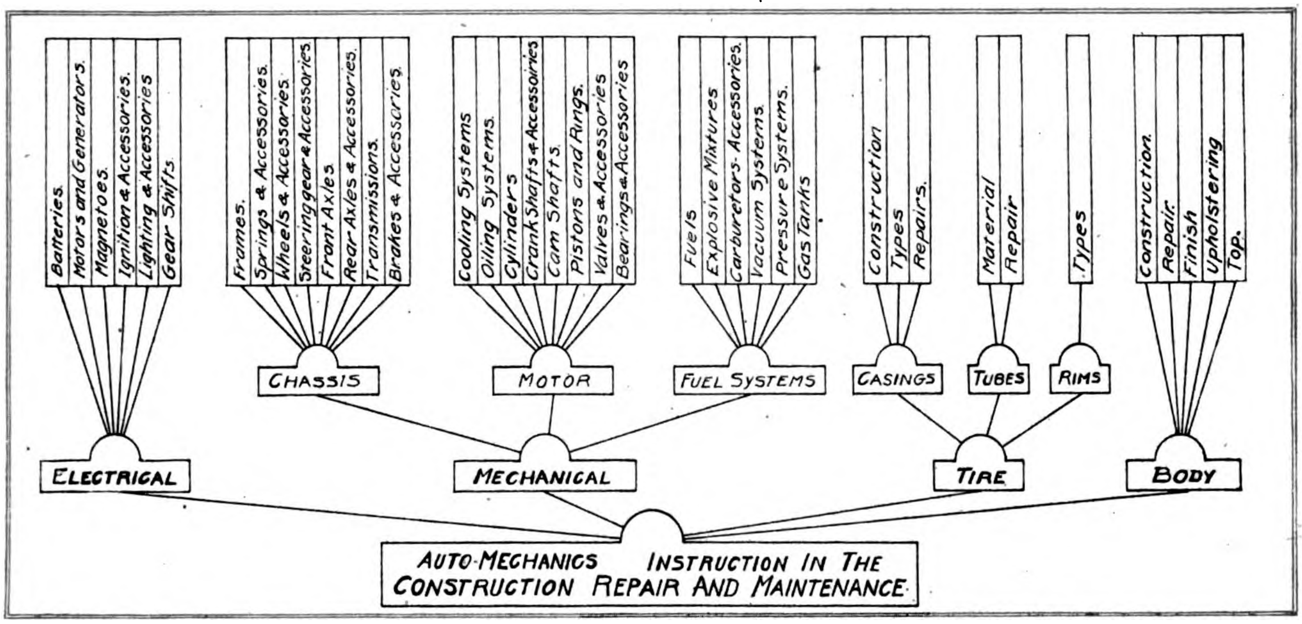


FIG. 7.

basis for *unit plans and courses* for teaching. Sample units are charted thru jobs and operations to suggest the skeleton outline followed in writing the unit analysis indicated later on sheets 4, 5, and 6 of the data sheets for recording trade analysis. There are some differences in classification bases in the kinds of trade work.

The Sheet Metal divisions are trade, major divisions, units, jobs, and operations. It is understood that, as unit analysis is carried thru as suggested in "Heating" under "Job Shop," some rearrangement of unit divisions may be found necessary. Until the unit analysis has been carried thru for the majority of the units in a major division the chart is at best tentative.

The chart of "What People Do" in Machine Shop work seems most usable when the levels are trade, major divisions, units, and operations. The trade terms the "job" often as that which takes the worker to a number of operations on a number of machines. In an analysis for teaching it seems advisable to retain this meaning for "job" and, in routing a student plus a job thru the shop, record the shop experience by divisions as suggested on the chart.

In the Bricklaying Chart the levels which seem most convenient are trade, major divisions, sub-divisions, units, jobs, and then detailed operations. Mr. Ray's device of lettering and numbering units is of direct assistance in designation in connection with planning unit courses. For example, "Jobbing A3" is "Jobbing and Small Contracts—Building—Small Houses, Stores, Garages—Jobs."

In the charts of Carpentry (Figs. 2 and 6) suggestion is made of the selection desirable from the field of possibilities. Perhaps some would prefer not so much detail. Some may prefer a heading of "Building Trades" above that of "Carpentry." The heavy lines on Fig. 2 indicate the selection for the sample detailing on Fig. 6. By reference to the level numbers immediate location is possible, and is expedited, for detail charts such as Fig. 6. "Framing," which is in level number 7, in Fig. 2, starts the levels in Fig. 6. By use of these level numbers the immediate location is available. In Fig. 6 is a suggestion for a method in indicating subdivisions between units and jobs.

In the chart of Automobile Mechanics the levels which seemed most adaptable are trade, major divisions, sub-divisions (where necessary), units, jobs, operations. In a number of classifications some use of minor subdivisions between units and jobs may facilitate use of the chart. There is need, as indicated in the chart, for use of one basis for classification of units in certain major divisions or sub-divisions and other bases in other divisions. It must be kept in mind also, as has been mentioned, that until the unit analysis has been carried thru for the majority of the units in a major division the chart is at best tentative.

(Concluded in February.)

"A man's value in the world is estimated and paid for according to the ability he uses, not what he may possess."

REAL-LACE MAKING IN A HIGH SCHOOL CLASS

Mabel W. Arleigh, Corning, California

AT THE beginning of last year we found it difficult to obtain material for a manual-arts course for girls in our high school at Corning, Calif. War conditions put metal and leather work out of the question. The pupils had had basketry, weaving, etc., in the grades and there was a demand for something new. So I introduced real lace. It has proven practical and fascinating. The pupils are enthusiastic.

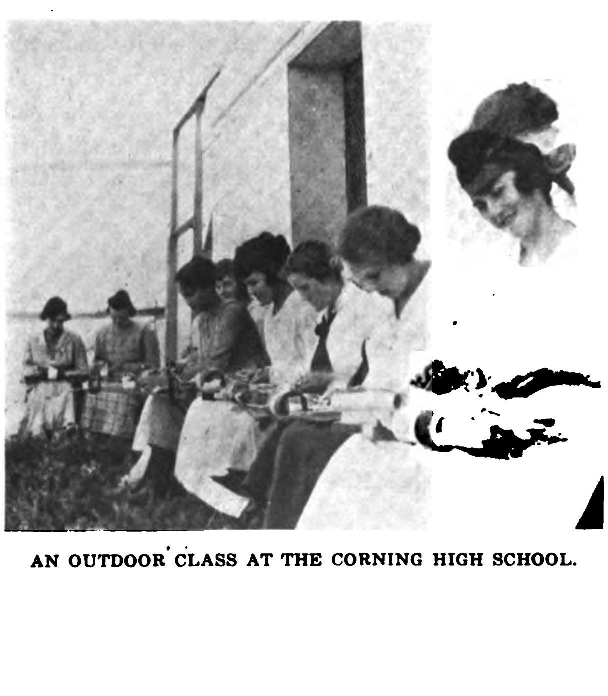
For some years I have desired to teach this work, but hesitated, knowing that the beginning of it would be unattractive in a class if I used the slow, tedious methods with which it is taught in foreign lands. Necessity compelled me to devise a quick introduction, adapted for class instruction. Since it has worked out successfully, it may be of value to other teachers. It is too difficult a task for grade pupils but it seems ideal for high school girls.

The socalled "real laces," such as Cluny, Torchon, Smyrna, Brussels, Maltese, etc., are made with bobbins. A pattern may require from a dozen to over a hundred bobbins. In school we use from a dozen to thirty bobbins in a pattern, and make lace from one-quarter inch to two inches in width. The pattern is pricked in thick, tough paper. This is pinned on what is called the pillow.

There are two varieties of pillows. One is a flat board, cushioned up about one inch thick, stuffed hard and tight with fine saw dust. We save the saw dust from the saw table. The other type of pillow has a revolving cushioned spool, two and one-half inches or more in diameter, and five inches or more in length. The pattern is pinned around this spool, and as it revolves, the pattern is endless, and any number of yards can be made without shifting.

The bobbins are spread out on the pillow, two being usually held in each hand at a time. As the bobbins are passed back and forth over each other their threads are woven. Pins are placed in the pin-holes in the pattern, and these hold the lace out in position.

PART OF AN EXHIBIT OF LACES MADE IN THE AUTHOR'S CLASS, SHOWING BOBBINS AND LACE PILLOWS IN USE.

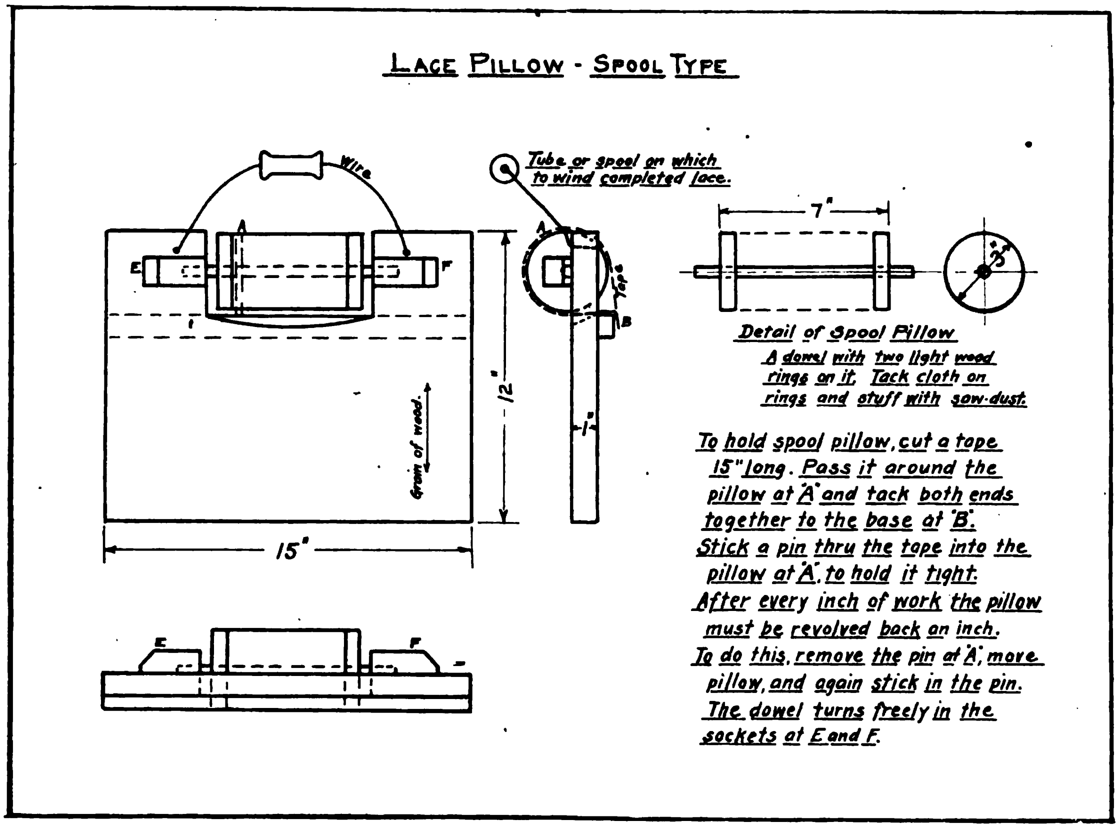


AN OUTDOOR CLASS AT THE CORNING HIGH SCHOOL.

The bobbins can be bought quite cheap, or made on a lathe. The pillows are easily made in a manual-training shop. We found it cheaper to buy the bobbins and make the pillows. The pupils can prick their own pattern. Pins and thread are easily procured. There is thus little expense for a large class. Lace an inch wide sells for a dollar a yard, so the work is worth while.

There are only three basic weaves, or throws, in bobbin lace. Combinations of these form every variety of pattern. We first fill the bobbins with carpet warp, and make a very course model of each pattern. The pupils can see this so clearly that they learn rapidly. Every pattern is first picked out and practiced with the carpet warp until it is perfect. Then it is easy to do it with finer thread without tangling. This idea of practicing with the carpet warp is what gives the quick and satisfactory results.

After the bobbins are wound, the thread must be fastened so that it will not unwind too readily. Make a little twist as in Fig. 1. When the thread gets short and you need to unwind, do not take out this twist; just turn the bobbin horizontal, and revolve it gently, pulling on the thread. The thread will unwind by slipping thru this twist knot. But when the bob-



DETAILS OF LACE PILLOW.
This makes a good project for the Manual Arts Department.

bins are held vertical, the thread will not slip thru this twist knot. Fasten every bobbin in this manner.

As you work the bobbins should lie in an even row across the pillow, with threads unwound about six inches from the pattern. As you work always keep the

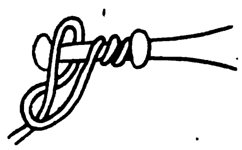


FIG. 1.

bobbins even. Always keep the pins in the lace for about two inches, so that it does not get pulled out of shape. Then remove the pins from the back row as you need to use them in working on.

Lesson 1, Four-Ply Plait.

Four bobbins, no pattern.

Tie the ends of the four threads together, and pin firmly to the pillow. Keep all threads about six inches long. Lay them parallel and even. Number the bobbins mentally from left to right. Each time a bobbin is moved it changes its number according to its new position.

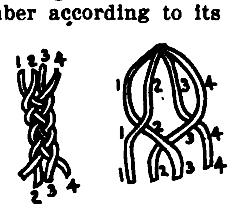


FIG. 2.

Net Weave. First lift bobbins number 2 and 4. Move them to the left, each over one bobbin, and lay them down. Then lift 2 over 3, so that it lies in the third place. These two movements together are called N, or net weave. Repeat the net weave and it is called hole weave, or H. H is thus just double N.

Continue the plait, or braid, by repeating the N weave. Hold the threads firmly and evenly. Give the bobbins a quick swing apart with each weave, so as to throw the weaving up close to the pin. Make a plait several inches long.

Practice until you can hold two bobbins in each hand, and roll them back and forth rapidly, making an even four-ply braid.

Lesson 2, Bobinet.

Six pairs of bobbins; pattern No. 1.

This pattern has 4 dots or pin-holes across the beginning end and a row of holes down each side,—not opposite each other, but alternate. Place these dots ⅝" apart. Tie the loose ends of the bobbins together in pairs. Pin the six pairs to the four dots at the top thus;—two pairs to each corner dot, and one pair each to the other two dots. Number the pairs from left to right. 1 2 N, (this means use pairs 1 and 2, net weave). No. 1, between 1 and 2, (pin in dot No. 1, between pairs 1 and 2).

1 2 N,
2 3 N,
3 4 N,
4 5 N,
5 6 N,
No. 2, between 5 and 6.
5 6 N,
4 5 N,
3 4 N,

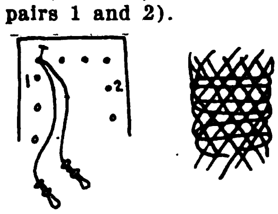


FIG. 3.

2 3 N, and continue by repeating from the beginning, pinning in the next dot each time, first on one side and then on the other.

C, means close, that is repeat after putting in a pin the weave which just preceded the pin. The C is used only after directions to pin.

Lesson 3, Diagonal Net.

Eight pairs of bobbins, pattern No. 2.

Pattern paper 2½" wide. Make dots ½" apart in alternate rows ¼" apart, so that dots are about ⅜" apart

on the diagonal. The top row has four dots, the next row 3 dots, the next 4 dots, and so on alternately. Pin two pairs to the right hand dot in the top row. Follow in a diagonal line down toward the left, pinning one pair in each dot.

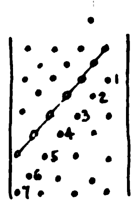


FIG. 4. PATTERN NO. 2.

7 8 N,
No 1, between 7 and 8, C.
6 7 N.
No. 2 between 6 and 7, C.
5 6 N,
No. 3, between 5 and 6, C.
4 5 N,
No. 4, between 4 and 5, C.
Continue thus with each two pairs in order toward the left.
1 2 N,
No. 7, between 1 and 2, C.
Repeat with each row.

Lesson 4, Base Net.

Eight pairs of bobbins, pattern No. 2.

Pin the same as for lesson 3.

The hole weave, H, is just double the N weave, but the effect is quite different.

Remember that C means close, that is repeat the H weave after each pin.

7 8 H,
No. 1 between 7 and 8, C.
6 7 H,
No. 2 between 6 and 7, C.
Continue as in lesson 3, using the H weave instead of the N weave every time.

Lesson 5, Bar Net.

FIG. 5.

Six pairs of bobbins, pattern No. 1.
Pin just as for lesson 1.
1 2 H,
No. 1 between 1 and 2, C.
2 3 H,
3 4 H, 4 5 H,
5 6 H,
No. 2 between 5 and 6, C.
4 5 H,
3 4 H,
2 3 H, and continue by repeating from the beginning.

Lesson 6, Linen Tape.

The linen weave, or L, uses 4 bobbins at a time, just as the H, or N; but the order of the throws is different, and the result is very different. Number the bobbins as shown 1, 2, 3, 4, from left to right.

First, lift bobbin 2 over bobbin 3.

Second, lift 2 and 4 one place to the left.

Third, lift bobbin 2 over bobbin 3.

The three moves above are named linen weave, or L.

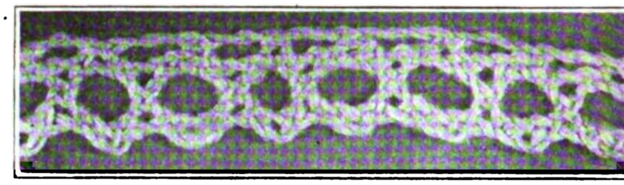
For the linen tape, use pattern 1, and six pairs of bobbins, pinned as for lesson 2.

FIG. 6.

1 2 L,
No. 1 between 1 and 2, C.
2 3 L,
3 4 L,
4 5 L,
5 6 L,
No. 2 between 5 and 6, C.
4 5 L,
3 4 L,
2 3 L.
Continue by repeating from the beginning, weaving back and forth.

Following are the directions and patterns for six simple laces. They are all based on the above introductory work. Work out each of the following patterns first with carpet warp. For this the dots should be three-eighths to one-half inch apart. For coats crochet-cotton mercerized, place the dots one-quarter inch apart. For No. 70 cotton thread, or No. 90 Barbours linen thread, place the dots one-eighth inch apart. Embroidery silk can also be used.

The pattern should be pricked on a strip of paper long enough to go around the spool cushion and lap well. The ends of the pattern must match perfectly where they lay. The spool cushion can be padded out by wrapping a piece of cloth around it part way, in order to make this matching perfect.



HOLE EDGING. SEE LESSON NO. 7.

Lesson 7, Hole Edging.

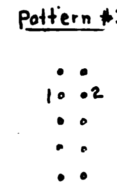
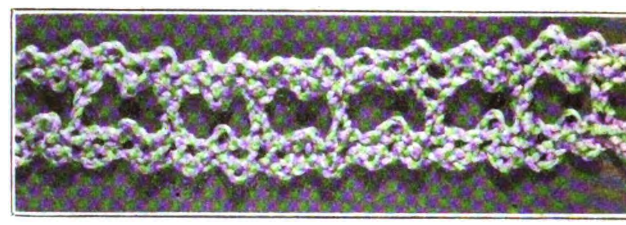


FIG. 7.

For handkerchief edge, or collar edge.
Five pairs of bobbins, pattern No. 3.
Pin in two upper dots.
2 3 H,
3 4 H,
4 5 H,
No. 1 between 4 and 5, C (draw 5 snug.)
2 3 H,
T 1 (this means twist pair 1, once to the left, or lift bobbin 2 over bobbin 1).
1 2 H,
No. 2 between 2 and 3, (draw 3 snug.) Repeat, endlessly.

Lesson 8, Beading.

Narrow beading for running a ribbon thru.
Six pair of bobbins, pattern No. 4.



BEADING. SEE LESSON 8.

Pin three pairs in dot No. 3, and three in dot No. 6.

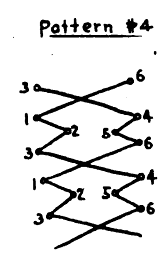
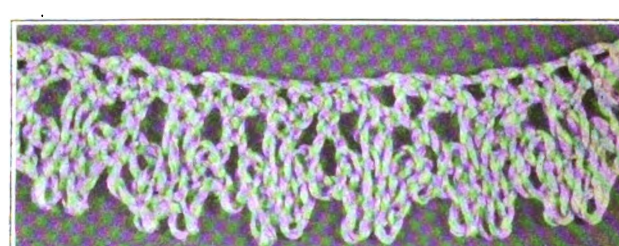


FIG. 8.

2 3 H,
1 2 H,
No. 1 between 1 and 2, C.
2 3 H,
No. 2 between 2 and 3, C.
1 2 H,
No. 3 between 1 and 2, C.
2 3 H
4 5 H,
5 6 H,
No. 4 between 5 and 6, C.
4 5 H,
No. 5 between 4 and 5, C.
5 6 H.
No. 6 between 5 and 6, C.
4 5 H,
T T 4, T T 3,
3 4 H,
T T 4, T T 3. Repeat.



DIMPLE EDGING. SEE LESSON 9.

Lesson 9, Dimple Edging.

Six pairs of bobbins, pattern No. 5.

Pin two pairs each in No. 1, No. 2 and No. 3.

4 5 H,
No. 4 between 4 and 5.
4 5 L,
T 6,

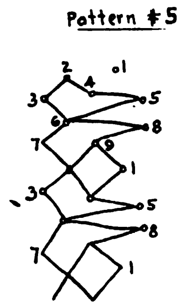


FIG. 9.

5 6 L,
T 6
No. 4 between 5 and 6.
5 6 L,
4 5 L,
2 3 H,
3 4 L,
No. 6 between 3 4, C.
2 3 H,
T 1; 1 2 H,
No. 7 between 2 3.
2 3 H,
4 5 L,
5 6 L,
T 6,
No. 8 between 5 6.
5 6 L,
4 5 L,
No. 9 between 4 5.
4 5 H,
5 6 H,
No. 1 between 5 6, C.
3 4 H,
No. 2 between 3 4.
2 3 H,
1 2 H,
No. 3 between 2 3; repeat from beginning.

Lesson 10, Picot Edge.

Seven pairs of bobbins, pattern No. 6.

Pin two pairs each in No. 4 and No. 7, and three pairs in No. 3.

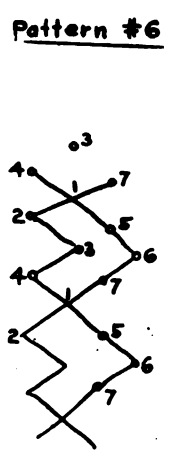


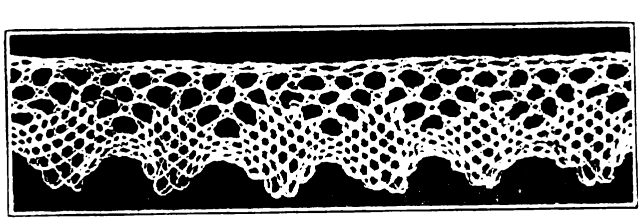
FIG. 10.

2 3 H,
3 4 H,
4 5 H,
5 6 N,
6 7 N,
No. 1 between 6 7.
5 6 N,
4 5 H,
3 4 H,
2 3 H,
1 2 H,
No. 2 between 2 3.
2 3 H,
3 4 H,
4 5 H,
No. 3 between 4 5, C.
3 4 H,
2 3 H,
1 2 H,
No. 4 between 2 3.
5 6 N N N (braid)
No. 5 bet. pair 6 (picot)
5 6 N N N,
No. 6 bet. pair 6 (picot)
5 6 N N N (braid)
No. 7 bet. pair 6 (picot)
5 6 N N N; repeat from the beginning. (For the picot, twist the thread once around the pin).

Lesson 11, Diamond Point Edging.

Eight pairs of bobbins.

Pin two pairs in 17, three pairs in 18, and one pair each in 6, 13 and 15.


DIAMOND POINT EDGING, PATTERN NO. 7. SEE LESSON NO. 11.

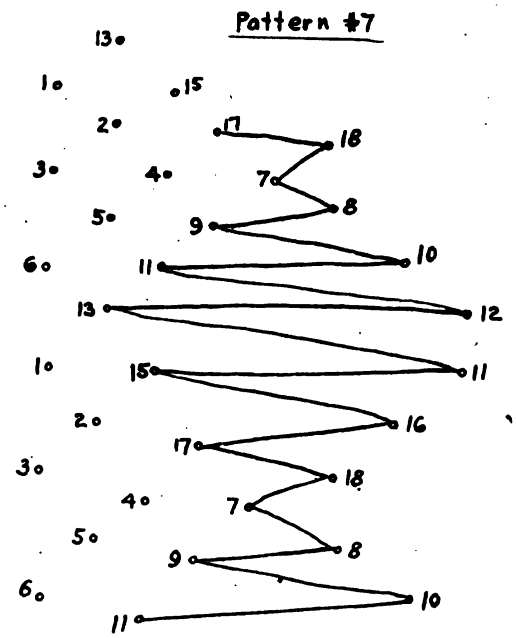
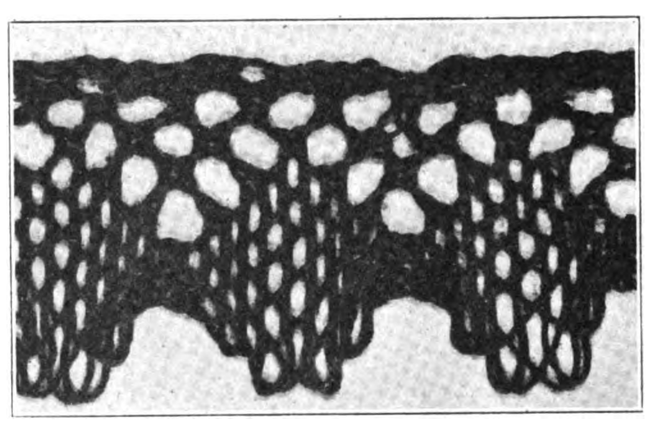


FIG. 11.

Selvage.
1 2 H,
No. 1 between 1 2, C.
2 3 N,
No. 2 between 2 3, C.
1 2 H,
No. 3 between 1 2, C.
3 4 N,
No. 4 between 3 4, C.
2 3 N,
No. 5 between 2 3, C.
1 2 H,
No. 6 between 1 2, C.
Point.
7 8 N, 6 7 N, 5 6 N,
No. 7 between 5 6, C.
6 7 N, 7 8 N,
No. 8 between 7 8, C.
6 7 N, 5 6 N, 4 5 N,
No. 9 between 4 5, C.
5 6 N, 6 7 N, 7 8 N,
No. 10 between 7 8, C.
6 7 N, 5 6 N, 4 5 N, 3 4 N,
No. 11 between 3 4, C.
4 5 N, 5 6 N, 6 7 N, 7 8 N,
No. 12 between 7 8, C.
6 7 N, 5 6 N, 4 5 N, 3 4 N, 2 3 N,
No. 13 between 2 3, C.
3 4 N, 4 5 N, 5 6 N, 6 7 N, 7 8 N,
No. 14 between 7 8, C.
6 7 N, 5 6 N, 4 5 N, 3 4 N,
No. 15 between 3 4, C.
4 5 N, 5 6 N, 6 7 N, 7 8 N,
No. 16 between 7 8, C.
6 7 N, 5 6 N, 4 5 N,
No. 17 between 4 5, C.
5 6 N, 6 7 N, 7 8 N,
No. 18 between 7 8, C. Repeat from the beginning.


PRACTICE PIECE WITH COTTON WARP. LESSON 11.

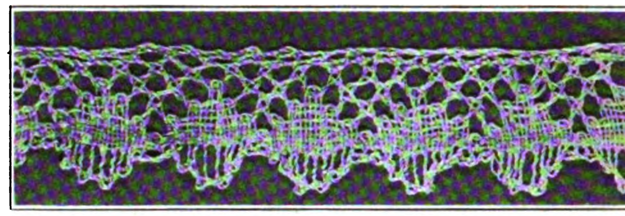
Lesson 12, Point Edging.

Eight pairs of bobbins, pattern No. 7.

Follow the directions for the diamond-point edging selvage. Then at Point use the following, instead. That is, these two laces have the same selvage edge, but the point differs.

Point.
6 7 L, 5 6 L,
No. 7 between 5 6, T 5.
5 6 L, 6 7 L, 7 8 H,
No. 8 between 7 8, C.
6 7 L, 5 6 L, 4 5 L,
No. 9 between 4 5, T 4.
4 5 L, 5 6 L, 6 7 L,
TT 7, 7 8 H,

No. 10 bet. 7 8, C; T T T 7.
6 7 L, 5 6 L, 4 5 L, 3 4 L,
No. 11 between 3 4; T 3.
3 4 L, 4 5 L, 5 6 L, 6 7 L,
T T T T 7, 7 8 H,
No. 12 bet. 7 8, T T T T 7,
6 7 L, 5 6 L, 4 5 L, 3 4 L, 2 3 L,
No. 13 between 2 3; T 2.
2 3 L, 3 4 L, 4 5 L, 5 6 L, 6 7 L,
T T T T 7, 7 8 H,
No. 14 bet. 7 8, T T T T 7.
6 7 L, 5 6 L, 4 5 L, 3 4 L,
No. 15 bet. 34, T. 3.
3 4 L, 4 5 L, 5 6 L, 6 7 L,
T T T 7, 7 8 H,
No. 16 bet. 7 8, T T 7.
6 7 L, 5 6 L, 4 5 L,
No. 17 between 4 5, T. 4.
4 5 L, 5 6 L, 6 7 L, 7 8 H,
No. 18 bet. 7 8, C.
Then make the selvage; then repeat the above point.



POINT EDGING, PATTERN NO. 1. SEE LESSON 12.

BABY'S FIRST CLOTHES—A PRACTICAL SCHOOL PROJECT

Edna J. Benson, Supervisor of Sewing, West Orange, N. J.

MR. F. M. M'MURRY, in a recent work, emphasizes the finding of specific purposes as one of the chief factors in study. This same thought may be applied to the selection of school problems in manual arts. The time has passed when we select projects just because they teach certain processes. They must fulfill a definite need. Sewing, if properly planned, offers us the opportunity to correlate the activities of the home and the school in a way which is sure to employ the natural interest of the girl.

It is the exceptional girl, around the ages of 11 to 13, who is not interested in the planning and making of the baby's clothes.

This problem is adaptable for seventh or eighth grade classes. The opportunity for enthusiasm and interest in this work is unlimited. Impatience to begin was noted in the repeated question, "When are we going to start the baby's clothes?"

Under the writer's supervision there were four eighth grades with an average of seventeen in each group. Two methods of the distribution of work might be employed, either making complete outfits in each group or allotting one or two garments to each group. Both methods have advantages. By the former the girls get practical experience with nearly all the garments, whereas the latter method is better for large classes. We chose the latter method because of the large number in the classes.

FIG. 1. A—TOP LEFT; B—BOTTOM LEFT; C—RIGHT.

Before the work was actually begun we talked and studied various methods of better care of babies. *The Woman's Home Companion* furnished us with charts, depicting types of clothing and the care of the baby.

Only the simplest of commercial patterns were used, as it was deemed unwise and impracticable to make fussy and overtrimmed garments. Two types of dresses were chosen, the simple one-piece kimono type, suitable for a slip and a set-in sleeve model; a long and short flannel kimono, and the Gertrude petticoat of nainsook and flannel. We omitted the barrow skirt, as it is not considered as satisfactory as the Gertrude, which hangs from the shoulder, while the barrow skirt is apt to constrict the freedom of the child. Rough laces and stiff embroideries were taboo; instead we had dainty stitches, French knots, feather stitching and the blanket stitch.

Each girl cut her own garment from the paper pattern. Typewritten directions, similar to those on the patterns, concerning each garment, were distributed to the girls before sewing. The following is a sample:

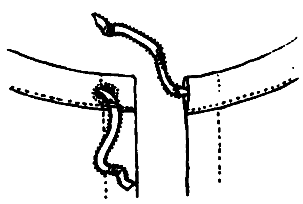
Short Kimono.

1. Baste long seams together on wrong side ¼" from edge.
2. Stitch.
3. Cut down wrong side of stitching. Catch stitch remaining edge flat after it has been trimmed. (See the Dressmaker, page 5, figure 11.)
4. Turn ¼" to wrong side around the neck. This turning must be nicked. Turnings around sleeves and bottom ¼". These are to be catch stitched. (See Clothing for Women, page 364, figure 215 B.)
5. These flannel hems are to be blanket stitched. (See The Sewing Book, page 8, figure 7.)
6. Sew on ribbons, one-half yard cut in two pieces. (See model.)

This was a splendid opportunity to teach independence and responsibility. Each girl was obliged to show her work before, and after, stitching. In this way mis-

takes were avoided. The girls were familiar with the different processes and were at liberty to consult various books and references in the sewing room. Aside from the first reading and explanation, the instructor was free from explaining each step and the girls followed according to individual speed. There was also a completed set of garments that served as models.

III. Photograph 1 shows the kimono slip and the set-in sleeve model. Both garments were made of fine nainsook and were of 24-inch length when completed French seams were used and each had a 1-inch hem feather stitched. Simple plackets 10 inches in length were made down the back. Around the neck, bias binding was used as a band. On the slip it was put on plain



but the dress was slightly gathered to fit the band. Both bands were larger than the baby's neck and narrow linen tape served as a draw-string. Before hemming this band down by hand it was feather stitched and an eyelet hole made on the left or under side, one-half inch from the edge of the band. No buttons were used, and when tied the placket lay flat without gaping. The draw string thru the neckband is considered much better than a fitted band, as the latter often proves too tight for the very young baby.

On the slip, one-half inch bias facing served as hems thru which narrow linen tape was drawn. An eyelet hole could be made in the hem around the lower edge and a draw-string used for a night slip.

On the dress, the sleeves were gathered to fitted bands, and the sleeves set in by the French seam method.

FIG. 2. A—LEFT; B—RIGHT.

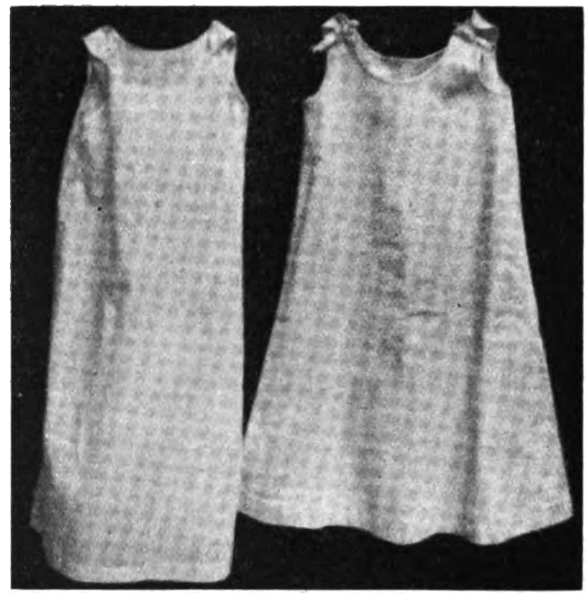


FIG. 3. A—LEFT; B—RIGHT.

The seams and first stitching of the bands were done by machine, the hems feather stitched and the bands hemmed by hand. It took 1½ yards of nainsook at 26 cents, wholesale; thread and tape were figured at 5 cents, making a total of 44 cents. The dresses sold for 60 cents and the slips for 55 cents. Before placing a price on the garments, investigation at the cheapest stores for the cheapest lawn dress was 79 cents.

III. Photograph 2 shows the short and long flannel kimono; also a bib made from the pieces which fell off the sides of the dresses. These were made of two thicknesses, feather stitched, and fastened with a tiny button, and sold for 10 cents.

The kimonos were made of outing flannel, blue and white checked, and pink and white checked. Directions for the short kimono have already been given. The only differences in construction between the long and short one were the 1-inch hem at the bottom of the long kimono and the double set of strings. Both were blanket stitched around the narrow hems with colored embroidery cottons and the wide hem feather stitched. Before the decorative stitch was used a flannel hem, of one turning, catch stitched with fine sewing cotton, was done. The short kimonos cost 30 cents to make and sold for 35 cents, while the long ones cost 40 cents and sold for 50 cents. The cheapest long kimonos were found to retail for 98 cents.

White dormet flannel was employed in the making of the flannel Gertrudes, the seams of which were stitched by machine, one side trimmed and the remaining side catch stitched flat. A 1-inch flannel hem was placed at the bottom, while around the neck and arm holes single turnings were catch stitched first and blanket stitched in white Utopia (two strands) as a finish. Narrow linen tapes were sewed flat on the shoulders to serve as fasteners. It cost 33 cents to make this garment and it sold for 40 cents.

The seams of the nainsook Gertrude were flat felled, the first stitching made by machine and hemmed flat on the wrong side. Hem at lower edge was 1 inch, made by machine, and one-eighth inch around neck and arm holes, made by hand. The method of closing employed here was a tiny button and loop on each shoulder. It cost 32 cents and sold for 40 cents.

Great emphasis was placed on the construction of these garments and the need for flat finishes and seams was explained. Pins, as a method of fastening, were objected to; as few buttons as possible, and those very small, while narrow draw-strings were considered very practical. It was pointed out that rough or raw edges were apt to irritate the delicate flesh of a tiny baby.

These plain and simply made garments were sold at an advertised sale to the mothers of school children, thru the school nurses, and a local community house and the nurses' settlement.

It was not our aim to make a profit on the garments, as most of them were sold to mothers of limited incomes, and we were serving the community. The latter spirit we emphasized with the children, and each one felt as if she were performing a service. It supplied the lack of Red Cross work.

A METAL WORK PROBLEM

G. A. Seaman, Perth Amboy, N. J.

THE writer desired for his classes in metalwork, a project which would embrace all the processes which the boys had learned during the earlier part of the year, and which would offer the greatest opportunity for practically applied mathematics. The motor shown in the drawings was evolved as fitting the requirements.

While there is nothing startlingly new in the design, there are a few features, notably the brushes and commutator, which are, perhaps, worthy of note.

The construction of the motor was carried on as a class problem, and individual assistance given only when a boy acknowledged himself "stuck". At the very beginning, emphasis was laid on the necessity of careful and accurate laying out and painstakingly following the layout. The use of the various tools, particularly taps, dies, and drills, was thoroly explained and demonstrated as they were required; and as each part was finished, the instructor checked it. Some little assistance in bending the field magnet, and in tapping the iron parts was given by the instructor, otherwise the boys were well able to handle the work.

The field magnet is of ¾x3/16-inch soft iron, and is formed at a red heat on an anvil, the curves being finished on a piece of pipe held in a vise. The right-angle bend is made first, and hooked over the side of the anvil, while a 45° bend is made in the other end, this latter being then formed into an arc on the pipe. This method insures the curves matching when the pieces are placed upright. The flats are then filed, and the two holes are drilled and tapped. The field core is a piece of ⅛-inch pipe cut to a length which will allow a 2⅛-inch disc to fit snugly into the curves, and the whole bolted together.

The brass pieces present no difficulty other than drilling the holes so as to bring them squarely across the pole pieces. This is done by clamping the brass to the pole piece, and marking thru the holes in the latter. Right here is an excellent opportunity for a demonstration and discussion of the use of the tap drills and body drills.

The armature is laminated, being made of three ⅛x1-inch pieces of soft iron, each cut to a template, and centered from the template. They are riveted together and keyed to a 20d nail, serving as a shaft, by filing a flat on the nail, and punching the armature iron into it. The shaft is centered in a frame by using a compass in several places on the curved pole pieces. The bearings are not drilled until both the field and armature are completed.

The brushes are made of thin brass, and are sufficiently clear in the drawing.

The commutator is made of two duplicate pieces of ¼-inch fiber, each being drilled with a ¼-inch drill, mounted on a spindle in a lathe, and locked on by a round nut of the size it is desired to make the barrel of the commutator. The fiber is turned and filed down to the size of the nut, leaving a shoulder or flange in which a fine groove is made with the point of any sharp tool. This is clearly shown in the detail drawing. Two small slots are then cut in one flange, in which the ears on the commutator segments are placed, thus keeping the segments from turning, and affording a place to solder on the armature connections. The segments are then placed on the fiber pieces, and the whole riveted together by a piece of ¼-inch copper tub-

PRIMARILY we must have schools, everlastingly and in numbers: schools of design for all the industrial arts situated in their respective territories with regard to production; also industrial arts teaching in the general schools, teaching of industrial arts appreciation in all the schools, not omitting colleges—all of this instead of meaningless and aimless drawing without objective in actual execution.

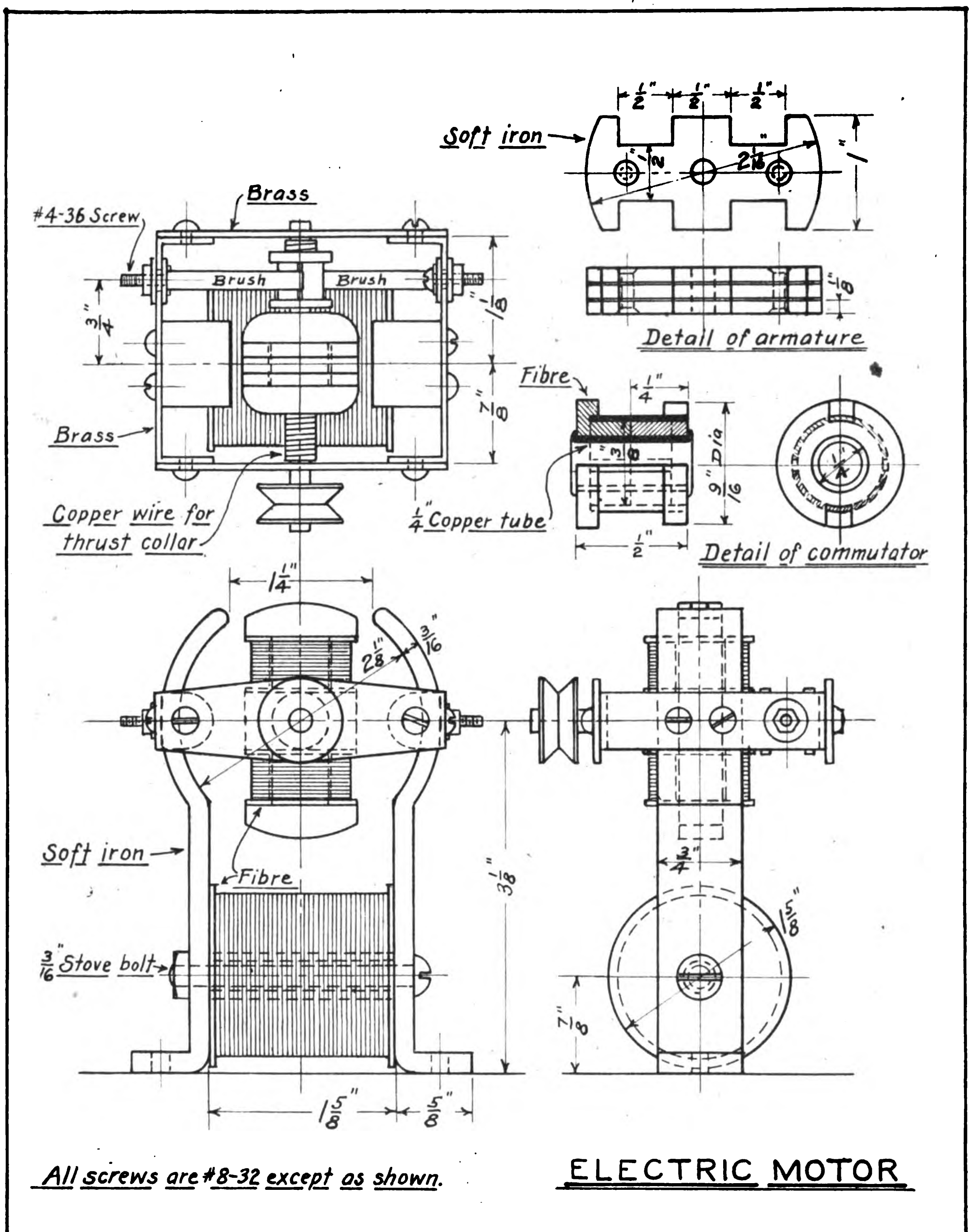
—*Richard F. Bach.*

ing pushed thru the center hole and flanged out on each end.

The commutator is a driving fit on the shaft, and needs no further fastening.

The fiber coil washers on the armature are split

While the construction of a small motor is a tedious and "fussy" proposition, no difficulty was experienced in keeping the boys interested, owing to the fact that, as every one knows, all boys are invariably enthusiastic about anything that "works". "Time out"



DETAILS OF ELECTRIC MOTOR.

and sprung into place. All coils are wound with No. 20 S. C. magnet wire, the armature by hand, the field by mounting it on a bolt held in a hand-drill. Care must be taken to wind the armature coils both in the same direction, otherwise they "buck" each other.

was also freely taken, to lecture on the various processes, to experiment with magnets and coils, and to explain and demonstrate the operation of a simple motor. The work was given to seventh grade classes spending their time equally between academic work and the shop.

WELL-TO-DO TEACHERS

E. E. Dodd, University of Missouri, Springfield, Mo.

ONE SUMMER afternoon, many years ago, three country boys, of whom the writer was one, went into a great woods to engage in the sport (for sport was the motive) of hunting squirrels. Shortly after entering the woods the boys met up with a neighbor boy, Josh Roberts by name, who said, "Boys, I want to get a squirrel. Sallie is sick, you know, and we want to make her some broth."

Sallie was the pretty sister of Josh and most popular among we country boys. A mandate from the war department would not have inspired motive in the boys as those simple words of Josh did. Each boy became a Nimrod in earnest, and the squirrels we bagged that afternoon would have made broth for the patients of Cook County hospital.

But what possible connection can there be between that long-ago quest for squirrels and the subject of this article, Well-To-Do Teachers? The answer is to be found in the word, motive.

As never before in the history of teaching, heed is being given to the salary interests of teachers. I should like to be able to state the case more broadly and strongly by saying, *to the permanent material welfare* of teachers, but present circumstances do not warrant so broad or strong a statement.

In the recent literature bearing upon teachers' salaries, including the reasons why they should be granted, almost nothing has been said upon what I regard as the motive of paramount importance; namely, this permanent material welfare of the teacher.

But just what does this mean? There is much significance in the somewhat common, homely expression, "Mr. X. is one of our well-to-do citizens," and how fine it would be if we could truthfully say, referring to any representative, experienced teacher, "Mr. T. or Miss T. is one of our well-to-do citizens." Well-to-do means having prospered in a material way; having laid aside something for the rainy day; having protection against the exigencies of age and the unexpected turn of fortune's wheel. Well-to-do means confidence, security, stability, responsibility and independence. It inspires respect, it suggests ability to provide, to help, to meet emergencies.

Applied to the teacher's case, well-to-do means adequate salary, the inclination and ability to accumulate, the knowledge and practice of safe, profitable investment. True enough, this all has a material sound. It does not smack of what we know as professional spirit, but it is just what teachers most need to ponder when the question of teachers' salaries is before them.

But, you say, "One thing at a time. Better get the adequate salary before you administer it; 'better catch your hare before you cook it.'" What I mean to say is, that the motive for catching the hare, like the long-ago motive for hunting squirrels, will play no small part in determining the result.

Permanent Material Welfare.

No one will question the urgency of present day living demands, or the part the teacher's salary must take in meeting them. But to proceed on the theory that the teacher's salary is adequate when it enables him merely to live from one pay day to the next, or on the theory that the teacher has then met all obligations to himself, is to proceed in purposeless fashion in a matter of profound concern to the teacher.

Does such a hand-to-mouth existence foster the qualities which make for strong manhood or womanhood; does it inspire confidence; promote self-reliance; prompt a spirit of independence or give protection against future exigencies? Does such an existence place the teacher before the school and the community in a favorable light? No; the factors which determine the well-to-do citizen are not there, and the evidence of his strength and potential usefulness are necessarily lacking.

To regard the teacher's salary merely as that which will meet the immediate temporal needs of the teacher, is to discount the occupation of teaching and place the training of the young in the hands of those who, by virtue of such a system, cannot develop the personal qualities which are essential to leadership of the young. To premise such a system denies to the teacher a fundamental aspiration of human nature, the love of possession both for the sake of possession and for what it will do and give.

To state the case positively, any survey of the teachers' salary question, made either by the teachers or the public, should look to the teacher's permanent material welfare; that is, to a status of the teacher wherein he can at least approach, if not fully share, the condition of the well-to-do citizen.

This means two things: (1) a salary that will admit of reasonable saving; and (2) the purpose on the part of the teacher to save, coupled with the ability to invest wisely.

When a teacher arrives at mature years, and takes stock as to his present and prospective status, one consideration forces itself into prominence—not, "How much was my salary thru the past years?" but, "How much do I have?" In other words, "How much did I save and how profitably did I invest my savings?" This is the big question, the one which will confront the teacher sooner or later, and what will it profit the teacher of large salary to find in his mature years that he has no savings and earnings to show for that salary?

But, on the other hand, the teacher of modest salary, if he has saved wisely and invested profitably,

not only has a material asset of great significance to show for his labor and thrift, he also has a mental equipment of value which was gained thru the progress of his saving and investment. Differently stated, the teacher, whether of kindergarten or university rank, who does not study and practice the art of saving and investment, goes undeveloped in a faculty that is fundamental to human happiness and welfare; while the one who does study and practice the art gains an advantage of the highest commercial and other value.

Knowledge of Investments.

The importance of a working knowledge of investment is exemplified in the personnel of the patrons of the postal savings, the savings bank and other forms of investment. The untutored foreigner chooses the postal savings with its two per cent interest return. He is not sufficiently informed as to the safety of the savings bank to trust his money to that institution with its four per cent interest return. The one who is a grade higher in investment confidently trusts his money to the savings bank. But the one who is well versed in investment opportunities passes on to a richer field where the interest return is materially higher.

Each one recognizes his limitations or capability in judging as to safety first and interest return. The foreigner finds his money safe with the government at two per cent; the money of the next in order is safe with the savings bank at four per cent; the money of the third is safe in note or bond which draws seven per cent.

In this conection, two questions can properly be applied to teachers:

1. Do they, as a class, when judged by their ability to make investments, belong to the two per cent, the four per cent or the seven per cent class of investors?

2. If they are to become well-to-do citizens, to what class must they belong? No one would be rash enough to place teachers in the highest class. The reason is simple; they have neither made a study nor gained experience in the art of investment.

The teacher knows geometry only as he learns it and learns to apply and teach it. The same is true of carpentry or cookery. A like application on the teacher's part to the study and practice of the art of saving and investment will bring a like result, a working knowledge in this important field.

The present time, with its attractive investment opportunities, well illustrates the advantage which those who are versed in investment enjoy. Such companies as Armour, Swift, Goodyear, Kresge, are offering notes and bonds which will yield from seven per cent to eight per cent return. The present also is the opportune time for teachers to ponder the question of saving and investment. With higher salaries, both actual and prospective, the motive as well as the investment opportunity is at hand.

Ambition to Become Well-to-do.

The ambition to become a well-to-do citizen should be fostered by the teacher. The advantage of having money or property which the teacher can call his own should be realized; the satisfaction of seeing this money or property work for him should be felt; the comfort and security which savings and earnings give should be enjoyed; the pride which goes with the possession of material things is a natural, worthy pride, which should be experienced.

All these, coupled with the misgivings which properly attach to uncertainty, risk and improvidence, should furnish a motive to the teacher of more than any ordinary moment. What stronger incentive to the study and practice of saving and investment could the teacher want? His security, his moral courage, his self-esteem, his standing in the community, his zest for work, his happiness, his ability to serve and protect others all depend upon his ability to save and profitably invest.

Just in proportion, too, as one learns to know the earmarks of a good investment, is he alert and keen to the danger-signs of the unsafe investment; and to be able to discern these two is an equipment which every teacher should possess.

The present tendency, as we all know, is to live too much in the short span which comprehends the present and immediate future. The training of teachers should give them a perspective that looks to the more remote future. They should study to conserve and invest to the ends that they may be rated as practical rather than visionary men and women; that they may enjoy permanent material welfare; that they may have a place in the community as well-to-do citizens, enjoying the prestige and advantages which those who belong to the well-to-do class enjoy. They will then be stronger men and women, better teachers and leaders of the young, more independent, self-respecting, self-reliant factors in both the school and community life.

The subject of this article, the well-to-do teacher, should become not merely a subject for discussion; its importance entitles it to become the objective of a movement, equal in importance to the salary question. It furnishes a primary motive for adequate salaries, for wise saving and profitable investment. It is an objective to which the teacher, as a reward for his training, responsibility and labor, should confidently aspire.

Teach economy, that is one of the first and highest virtues. It begins with saving money.—*Lincoln.*

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

A REMINDER AND A FORWARD LOOK.

WITH this issue, THE INDUSTRIAL ARTS MAGAZINE starts on its seventh year. It began its career in January of that fateful and tragic year of 1914. These six years have been tempestuous years the world over. Editors and publishers know only too well how difficult it has sometimes been in the stress and anxiety of war to "keep the home fires burning" and to "keep the school shops running." Those responsible for this publication, in common with editors and publishers everywhere, have faced unparalleled shortages and uncertainties in the paper market; have met the universal problem of labor shortage; and have encountered prohibitive costs at every turn.

Now, as we begin to discern just the faintest gleam of a hope, not yet realized, of a kind of universal relief from all these trying conditions, we are conscious of a deepening sense of satisfaction and gratitude for those favoring fortunes that have kept our friends faithful and have added to their numbers; that have increased our capacity and our ambition for service; and have given us courage and high hope with which to face the next six years.

GETTING WHAT ONE WANTS.

THE annual Conference of Art Teachers was in session. The program committee, for some unexplained reason, had not functioned, except to appoint a chairman. A goodly assemblage of kindred souls and no formal program was unique in the annals of this organization. Yet it was called a Conference, and conferences may be held without a formal program. So the chairman invited several of the teachers present to tell of their work, on the supposition that opportunity to complain of existing conditions is rarely ignored by teachers.

The chairman secured response from several members. Some had classes altogether too large for individual instruction. Some had almost no classes, because of lack of interest in the subject. Some could not secure materials. One teacher was overwhelmed by having a class in mechanical drawing and a class in freehand drawing at the same time and place, both of which demanded her individual attention.

Then there arose in this discouraged gathering of unfortunate art teachers one of those belligerent crusaders who announced her purpose of putting art on a higher plane of appreciation. She complained bitterly of the evident discrimination against art by other school and public interests. This vigorous disciple of art demanded that every art teacher "see to it that art be given as much place and importance in the school curriculum as any other subject." "Art, the greatest expression of civilization!" "Art, the subject that applies to every interest in life, must not be relegated to a minor place on the program, but must be a required study in the schools."

This sentiment met with general approval. Then one quiet little woman rose in her obscure corner and made the startling announcement that in her school "the Art Department was given everything it needed and sometimes more than it wanted." "Our Art Department is co-operating with every other department of our school in some way. We have made ourselves necessary to the study of various subjects, because art applies to every interest in life, and the school subjects represent these interests.

"We welcome the opportunity to make ourselves useful to those interests. Our only regret is that we cannot make ourselves more useful for want of time and energy. My pupils work overtime drawing, designing, and making the necessary things for the school community. This spring, in place of the usual Art Exhibit, we are going to have a bazaar and pageant in co-operation with other departments, which will represent the school activities. We believe that the only way to make art important in the school is to make it useful to the school."

WELL-TO-DO TEACHERS.

MR. E. E. DODD's article, found elsewhere in this issue, raises a most important and timely question. We trust that when this article is read it will not be dismissed with some facetious reference to the inadequacy of teachers' incomes and with that sort of impatience with which one receives suggestions from an impractical theorist.

We have abundant reason to suspect that the writer of this article knows what he is writing about. We should be willing to hazard the guess that he might be properly regarded as a good example of the highly successful teacher who, thru reasonable frugality and discriminating investment, has placed himself in that enviable class of well-to-do citizens.

Whatever may be said of the practicability of such a proposal for all teachers, it cannot be denied that such an ambition is altogether a worthy one, and one that will and should receive very great emphasis in the next few years. Certainly a very large number of teachers could make at least small, safe investments each year, judging from the manner in which they came forward in Liberty Bond purchases during the war. Large or speculative investments are not contemplated in this discussion. But, as Mr. Dodd indicates, perfectly safe and satisfactory returns may be secured from investments on plans of weekly or monthly payments similar to the plans of the various Liberty Loans.

The teacher, at least, owes it to himself or herself to investigate the possibilities of substantial returns from small, regular, and safely secured investments. It is only fair and reasonable that teachers should devote some thought and effort toward their own future independence and comfort. And even if it should not be immediately possible to accomplish all that is desired along this line, there should be a vigorous and sustained movement inaugurated not only to see to it that teachers are adequately paid but also to furnish them with such authoritative information and guidance as will make possible wise and safe investments with the assurance of early and substantial returns.

BILL AND OLD PROFESSOR X.

It was at the class reunion that a substantial member of the class, a successful contractor, recalled to our minds old Professor X. as the one teacher of our youth whose instruction had influenced him most. Of course we all remembered the easy-going, kindly old gentleman who had passed on to his reward, and we were much surprised that Bill should single him out as the one whose instruction in art had functioned in the life of a busy contractor.

Some of us recalled how we had taken advantage of the easy-going methods of Professor X., and had taken little advantage of his wise instruction; but Bill was enthusiastic. To Bill, this almost forgotten teacher marked the sharp turn in the road that leads to success. Not that Bill was a great creative artist, for he was much better at Arabic than Greek figures, as we all knew. Bill could figure his expenses at school to the last cent, and he had earned most of those expenses while in school, doing odd jobs about the campus.

Now Bill gave each year to the support of the school as much as some of us could earn per annum. Wherein, then, could Bill have secured the incentive for a successful business career from his study of art? Let Bill tell us in his own words:

"I took instruction in Art with Professor X. because the course was a part of the curriculum in architecture that was designed to make creative artists, and which I followed as a matter of interest in building.

"I secured three convictions from that instruction: First, that I could never hope to become a great artist, because I lacked the creative genius. Second, that art is the most valuable production of human energy, because it marks human progress by the adaptation of materials to convenience and beauty. Third, that in our modern social organization the artist must find expression thru the faithful production of the artisan.

"With these convictions I determined to become the faithful producer of artistic monuments, and I am almost as proud of the buildings I have erected as the designers of them should be."

Bill had followed a course of study under a teacher skillful enough to instill respect for the subject. Bill had *found himself* under the wise guidance of old Professor X.

THE CONTINUATION TEACHER'S OPPORTUNITIES AND RESPONSIBILITIES.

A teacher of Continuation subjects in a community where the employers have not yet agreed to pay the pupils for time spent in school, remarked, "I should feel almost criminal if I were to consume these children's time in my classes without giving them something definitely helpful and profitable—something that fits into their conscious needs, their purposes, and their lives. I should feel as if I were taking money from them without giving them value received for it."

Does anyone doubt that a teacher with such a conception of her duty and her opportunity will always give abundant returns for every penny sacrificed by the part-time pupils who must come to her classes? But whether the employer pays for the time or the young workers lose the wage, and thereby pay for the privilege of attending school, the obligation is the same on the part of the teacher. In the continuation school, it is an eternal race with the rapidly disappearing opportunities. Next year or next month or next week may be too late to reach certain ones who may be sorely in need of assistance. The eight hours per week may seem to some to be too short in which to accomplish anything worth while. What an error! Eight hours per week may be sufficient time in which to arouse new interests, to discover new aptitudes, to develop new ambitions, and to change the whole course of multitudes of young lives. Eight hours a week may be so skillfully organized and employed and related to the every-day lives of the pupils as to make of their daily tasks laboratory experiences that will interpret and enrich the school classwork.

The proper conception of the continuation school work, therefore, is that it carries the school into the shop and store and office wherever boys and girls are found, and in return carries the shop and store and office into the school and uses all for the education and advancement of the youthful workers who have heretofore been lost to the schools.

Let it be said, therefore, to continuation school teachers, especially during the early days of the pupils' return to school: "Waste no time; deal with those topics only which have vital messages for the pupils; make sure that the work grips the pupil with an interest that insures his utmost efforts; become familiar with the pupils' lives, their homes, and their work; be their friends, share in their difficulties and their hopes, and keep them eternally busy with problems that vitally concern their present and their future welfare."

The University of the State of New York **is offering 25 scholarships to persons who desire to prepare themselves for trade and industrial teachers. Those selected to hold the scholarships must complete a one-year industrial teacher-training course, after which they are licensed for life to teach a trade, industrial or technical occupation in the state.**

The Farm Repair Shop as a Factor in Project Work

A. B. Carter, Nashville, Tenn.

DOUBTLESS many teachers of vocational agriculture will this year for the first time have students enrolled who desire to choose as their project some phase of farm repair and construction work. In considering the feasibility of such projects as those the importance of the farm shop cannot be overstressed. The success of a project in repair or construction work depends largely upon the facilities offered by the farm home in the way of a work shop and equipment.

Modern farm methods have led to the introduction of many costly and intricate machines. To keep those machines in repair and in proper working order requires more mechanical skill than is possessed by the average farmer. Farm repair and construction work is, or ought to be, a phase of scientific agriculture, and as such ought to measure up to the standards set by good farming practice.

The boy who has had two years of training in the school shop, provided he is of the "mechanical turn," should have acquired sufficient manipulative skill to carry out successfully a project in repair or construction work. Most boys like to tinker with tools and they show a surprising aptitude for learning the mechanism of farm machines. To such boys as these the repair and maintenance of the farm machinery and implements suggests itself as an attractive project. Other boys show more enthusiasm over construction work; to such as these we suggest the construction of fences, gates, laying new roofs, building poultry houses, etc. There are others who would be interested in painting as a minor project; for these we suggest the painting of the barns and outbuildings. After having acquired sufficient skill the painting of the farm home would appeal to them as a supplementary project.

To the less experienced teacher a word of warning may be in order. Too frequently manual training teachers have been criticised for the mere development of mechanical skill. It is not our thought to disparage the value of mechanical skill, for in itself it is worthy of much consideration. Nothing is easier than falling into slovenly methods of performing an exercise. This leads ultimately to careless and inefficient work. The teacher should rather keep in mind as his main objective the development of a purposeful activity, which is the outgrowth of choosing and planning a project, the selection of tools and materials, the procedures and records kept.

In order to insure the success of a project at the outset, a definite understanding with the parent is imperative. The farm shop and its equipment, if the project is one of repairs, the terms under which it is to be used, the supply of materials, and the labor compensation are some of the points upon which to agree. If it is to be a project in construction work there must be a definite agreement as to who shall furnish the materials and on what basis the boy shall be recompensed for his time and effort. The parent, if he is wise, will refrain from interfering in any way with the supervision on the part of the teacher. Should the equipment of the home shop prove inadequate, satisfactory arrangements may be made whereby the school shop equipment may be made to supplement in such emergencies. In every project undertaken sympathetic relations must be established between the parent and the teacher; the combined effect of these will then act as a stimulus to the student.

There must at all times be a hearty co-operation between the teacher and the student. Before undertaking any exercise involving considerable outlay of time and expense, the student should be required to submit to the teacher plans and outlines of the contemplated exercise. By following this plan costly mistakes may be avoided and ultimate discouragement saved the student. Careful records of all labor expended, materials used, and expenses involved should be required of the student. It is a wise provision to insist that these be presented at the completion of each exercise. Such a practice affords applied business training and is not to be minimized. Other points for scoring the student's project, such as the appearance of the shop, condition of tools, quality of work, and workmanlike methods may prove suggestive.

Blackboard Perspective Drawing

Wm. V. Winslow, North Tonawanda, N. Y.

WITHOUT a doubt many teachers are endeavoring to present object drawing without giving the class a sufficient amount of tangible information upon which the student can base his effort. It is equally true that this particular kind of drawing will be of most value to the majority of students. How can the principles of perspective best be taught?

Just how much time should be allowed for this phase of art is not important so long as the student understands in a general way the principles of perspective and is able to apply them. Upon leaving the grammar grades the boys and girls, I think we will agree, should be able to express themselves by means of pencil and paper. This ability is developed to some extent in most school systems in the academic classroom,

but object drawing will receive additional motivation in the industrial department, where the boy will find it to his advantage in working out ideas of construction.

Object drawing will appeal to the boy if he understands its principles. It may be well for him to be told that "parallel, horizontal, receding edges appear to come together," and it is of some help for him to see a diagram in a textbook or one copied on the blackboard to illustrate this principle. It is undoubtedly better pedagogy for a teacher to actually show how the principle works. The photographs here presented give a clear idea of how perspective may be illustrated.

One reason why object drawing is not given more attention in the grade schools is that it is oftentimes difficult to secure good results from the class generally. It seems that teachers of drawing desire to have more showy work on the part of the students. They spend considerable time drawing flowers, making landscapes and using colors. This kind of work is excellent for the developing of appreciation of the fine arts, but when it comes to drawing objects with understanding of the principles of distance and position, teachers often feel that this is too difficult. However, we will agree that object drawing is most important notwithstanding that it is sometimes difficult to teach.

If it is not presented in its simplest form and in a logical way the student is confused. Hence the work is uninteresting, and this is bound to show. Without going into detail regarding the location of vanishing points on the horizon we can take it for granted that there are such points. This may be developed by the teacher in making an isometric drawing of a cube on the blackboard. The class will readily see that this is not a true representation. The teacher then may change it to more nearly resemble the appearance of a cube. It will be seen in the drawing that the oblique lines on either side of the front vertical edge must come together. The

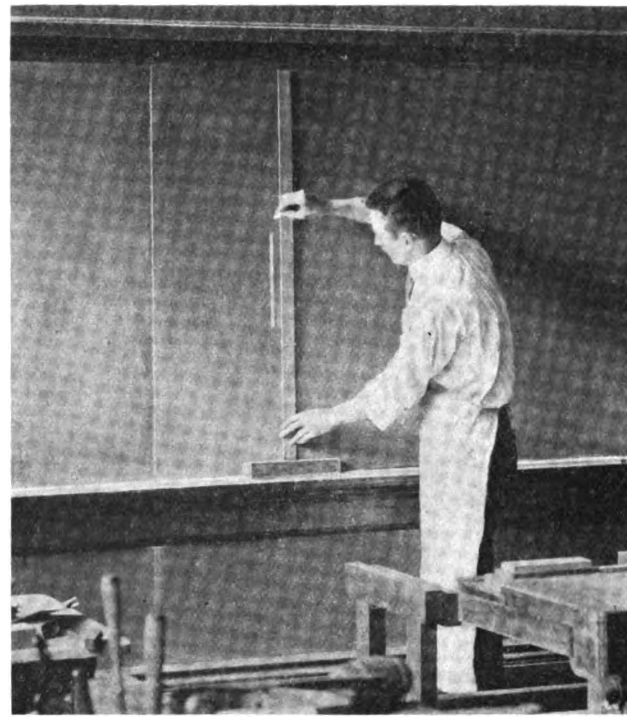


FIG. 1. THE STRAIGHTEDGES MAY BE SEEN AT THE TOP OF THE BLACKBOARD.

photograph, Fig. 2, shows two straightedges carried to vanishing points. I believe that in teaching perspective the very bigness of this method makes it impressive. The blackboard is free from all other drawing or writing that would be distracting to the student.

In representing any rectangular solid the front vertical edge is drawn first, then the two upper oblique edges of the object nearest to the observer. Fig. 1 shows that the front vertical edge is drawn with a T-square which is slid along the chalk rack. (In this illustration the straightedges are supported by means of a hook above the center of the blackboard where they are kept when not in use.)

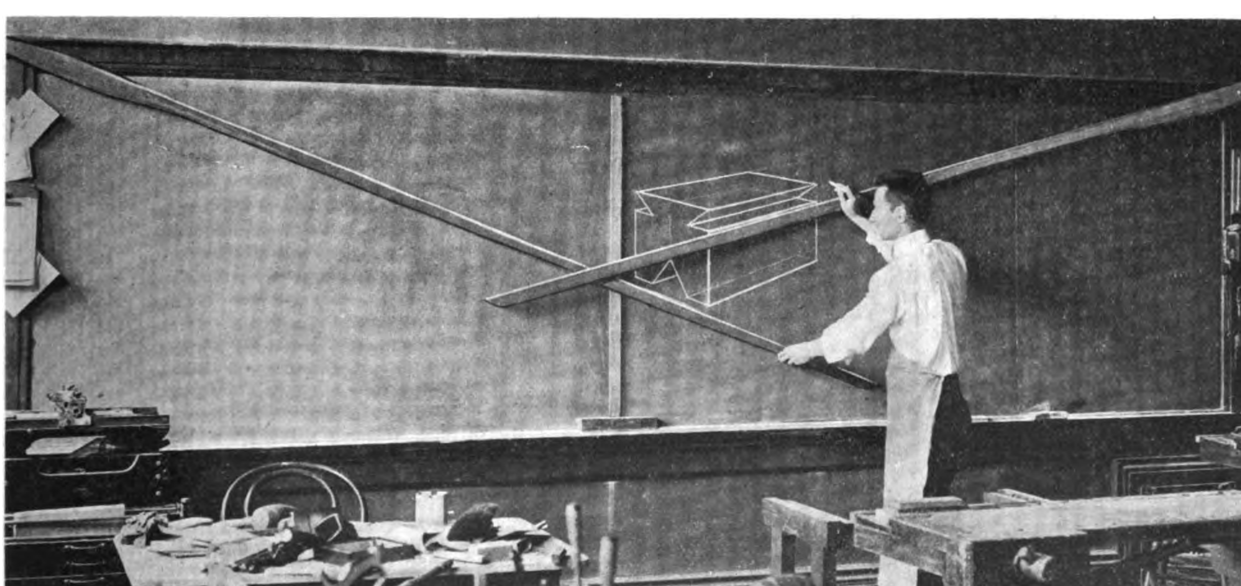


FIG. 2. THE STRAIGHTEDGES IN USE.

In the shop many teachers themselves would prefer to be more proficient in object drawing. These men may be mechanical rather than artistic. There is an interesting field open for them thru the study of mechanical perspective. For all practical purposes, such as arise in the shop, the accompanying photographs give sufficient information for constructing blackboard perspective apparatus:

1. The T-square is used for drawing all vertical lines.

2. The straightedges are used for drawing the principal oblique lines.

3. When thickness is represented by means of the vertical line the length and width are estimated on the oblique lines.

4. To find the center in perspective (taking for example one of the faces of the cube): Draw diagonal lines from the corners.

5. The object may be drawn very lightly at first, then heavier, either mechanically or freehand.

A Course in Automobile Construction, Operation and Repair

(Conclusion)

Harry W. Anderson, Director, Automobile Department, U. S. Army Vocational School, Fort Sill, Okla.

SUGGESTIVE LECTURE OUTLINE.

Trouble Shooting.

1. *Introductory:*
   (a) Machinery liable to trouble.
   (b) The internal combustion engine as a piece of machinery.
   (c) Any abnormal condition is trouble.
2. *Four General Classes of Trouble:*
   (a) Carburetion.
   (b) Ignition and electrical system of car.
   (c) Cooling system.
   (d) Mechanical (include oiling).
3. *Troubles Due to Carburetion:*
   A. *Rich Mixture:*
   Carburetor—what it is—modern carburetor mixing accomplished by stream of air passing a nozzle or jet or multiples of same.
   Ideal proportion—what it is—judge carburetor and mixture by performance of engine.
   Proportioning air and gasoline at high speeds—how accomplished in various carburetors.
   1. Symptoms of rich mixture:
      Black smoke.
      Smell of raw gasoline—pungent odor.
      Reddish yellow flame issuing from cylinder when petcocks are opened.
      Loping or galloping of motor.
      Engine overheating.
      Pre-ignition.
      Carbon forms rapidly.
      Pitted valves.
      Sooted plugs.
      After-firing (in muffler).
      Sluggish motor—no pick-up.
   2. Causes of rich mixture:
      (a) Too much gas fed to the carburetor.
         Too much pressure (pressure system).
         Float valve stuck open.
         Heavy float (cork float soaked with gasoline).
         Punctured float (hollow metal float).
         Sticking float.
         Sticking toggle levers.
         Dirt on float valve seat.
         Bent needle in float valve.
         Improper float level.
      (b) Too much gas fed thru the carburetor.
         Faulty adjustment of the needle valve.
         Needle valve seat worn or improper seating of the needle valve.
         Air valve spring too tight.
         Improper jets (Zenith).
         Venturi tubes too small (Zenith and Stromberg).
      (c) Too much gasoline in the cylinders.
         Too much priming.
         Primary air passage obstructed.
         Vacuum system—suction valve open from heavy float other cause thus letting gas into suction pipe from intake manifold.
   3. Remedies (explain according to causes):
      Explain remedy for soaked cork float.
      Explain remedy for punctured metal float.
      Explain setting of float level (general rule for nearly all carburetors, float level about one-eighth inch lower than jet or nozzle hole).
      Clean jets by blowing compressed air thru them.

   B. *Lean Mixture:*
   1. Symptoms—Misfiring, coughing, popping, and backfiring in the intake manifold and carburetor.
   2. Causes of lean mixture.
      Too little gas fed to the carburetor.
         Break or leak in gas line.
         Gas supply exhausted.
         Gas supply valve closed or nearly closed.
         Stopped gas line.
         Water in gas or float chamber. Also ice.
         Tank air bound (gravity system).
         Too little pressure (pressure feed).
      Too little gas fed thru the carburetor.
         Float level bent shutting gas off too soon.
         Dirt in carburetor stops flow thru jets.
         Needle valve adjustment faulty.
         Carburetor float or toggle levers sticking.
         Spray nozzle too small.
      Air leaks.
         Air valve spring too loose.
         Air valve stuck open.
         Loose carburetor flange.
      Leak in manifold.
         Leaks at gaskets, plugs, compression cocks, valve stems.
   3. Remedies:
      Repair leaks in gas supply line.
      Fill tank with gas.
      Open gas supply valve.
      Eliminate the water from the tank, gas line and carburetor.
      Change and test float level.
      Change needle valve adjustment.
      Blow out jets.
      Change tension on air valve spring.
      Repair leaks at carburetor flange.
      Repair leaks at intake manifold.
      Repair leaks at gaskets.
      Tighten plugs.
      Put in valves with oversize stems.

   C. *Backfiring.*
   1. How caused. How differs from after-firing.
      Slow burning of weak mixture (still burning when valve is opened on next intake stroke).
      Late explosion.
      Spark improperly timed so comes on intake stroke.
      Intake valve slightly open.
      Leaky or warped valve.
      Premature ignition.
      Symptoms of lean mixture show up when starting cold motor. After motor is warmed up motor runs O. K.

   D. *Adjusting Carburetor:*
   Warm motor—retard spark—throttle not over half open—adjust needle valve.
   Advance spark—open throttle—adjust auxiliary air valve.
   Try on road and make further adjustments while car is running along road.

Typical rules for adjustment:
Stromberg—Warm motor—spark well advanced—throttle half open or more—set high speed adjustment.
Spark retarded—throttle closed—make low speed adjustment.
Schebler Model R—Warm motor—set spark retarded—throttle almost closed. Adjust low speed.
Advance spark—throttle open—adjust high speed, or auxiliary air valve.

E. *Smoke Issuing From Muffler:*
Black }
Grey }
Light blue }
How caused.

F. *Analogy of External and Internal Combustion Engines.*
Composition of gasoline, H & C (a mixture of chemical compounds rather than a definite chemical compound).
Carburetion and combustion.
Definition of combustion.
Comparison of correct and incorrect combustion.
1 lb. Air }
7 lb. Gas }
CO—4,500 B. T. U.
(Emphasize loss of heat values and consequent loss of power from incorrect combustion.)
1 lb. Air }
10-15 lb. Gas }
CO_2—14,400 B. T. U.
Products of combustion.
CO or CO_2
H_2O

G. *Necessity for Conservation of Petroleum Resources.*

H. *Conclusions:*
Only two adjustments of carburetor required.
Summer—Slightly lean mixture preferable.
Winter—Slightly richer.
No adjustment of carburetor should be attempted until sure that ignition system is O. K.
Only proceed with carburetor adjustment with definite rules.

TROUBLE SHOOTING OUTLINE.

Ignition.

I. *Introductory.*
(a) Ignition as a source of trouble.
(b) Ignition systems:
Battery.
Make and break.
Jump spark.
Low tension magneto.
High tension magneto.
Battery and generator.

II. *Two Ways of Tracing Trouble:*
(a) From spark plugs to source of current.
(b) From source of current to plugs.

III. *Causes of Trouble in Ignition System:*
A. Spark plugs.
1. Cracked porcelain or oil soaked.
2. Sooted.
3. Incorrect gap .025 average (use AC gauge, not worn dime unless know thickness to be .025.) Dixie magneto .020.
4. Plugs not compression tight.

B. Terminals.
1. Loose—from strain or vibration.
2. Corroded.

C. Chafed wires.
1. From rubbing against motor head.
2. Cooked wires.
3. From fan belt (Ford).
4. Ground wire from magneto breaker head to switch.

D. Distributor.
1. Disc dirty.
2. Distributor plate cracked (magneto).
3. Brushes defective.
4. Broken rotor button.
5. Button out.

E. Contact Breaker.
1. Wrong adjustment of points—too far apart—too close together.
2. Points dirty, black or pitted.
3. Points worn.
4. Stationary block insulation gone.
5. Magneto points sticking in wet weather from swelling of fibre block.
6. Clockwise breaker on anti-clockwise magneto and vice versa.

F. Magneto collector ring and brush.
1. Brush track dirty.
2. Insulation broken down because of safety gap or points too far apart.
3. Oil soaked insulation.

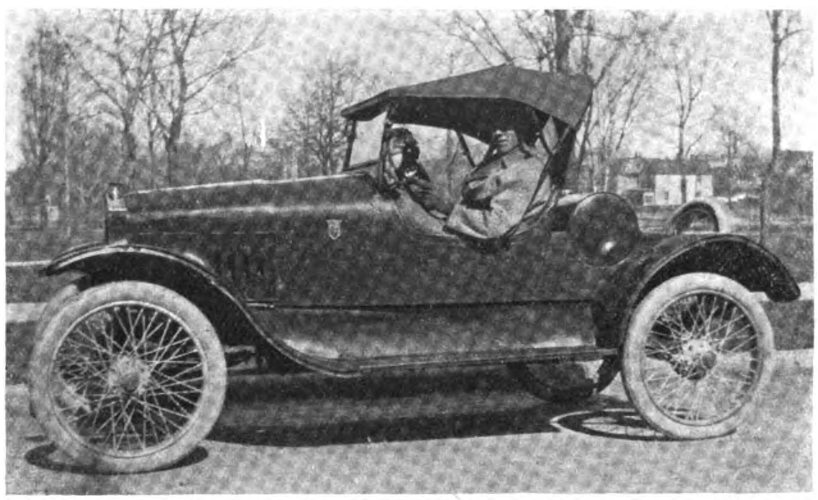
G. Condenser.
1. Defective—noticed by arcing and heating of break points, also weak spark.

H. Magneto armature.
1. Short circuits.
2. Open circuits.
3. Oil soaked.
4. Rubbing of windings against pole pieces.

I. Magnets.
1. Weak.
2. Reversed.

J. Magneto Safety Spark Gap.
1. Defective.

K. Battery troubles.
1. Dry cells.
(a) Shorts.
(b) Zinc shells on contact.
Material of box containing cells, metal instead of wood.
Terminals touching.
Moisture in container.
(b) Loose terminals.
(c) Dead cells.



A FORD RUNABOUT REBUILT IN A SCHOOL SHOP.

2. Storage batteries.
   (a) Corroded terminals.
   (b) Chafed wires—rubbing against battery sling, frame or body box.
   (c) Internal short circuits.
   (d) Frozen battery.
   (e) Buckled plates from overcharging and overheating.

IV. *Remedies—Outline as Listed Under Troubles.*

TROUBLE SHOOTING OUTLINE.

Cooling System.

I. *Introductory.*
   A. Sometimes sign of malfunctioning of carburetor and ignition system.
   B. Cooling system at fault.
   C. Cooling system troubles, caused by engine or other sources.

II. *Cooling System Trouble Due to Carburetor.*
   A. Over rich mixture. Adjust carburetor.
   B. Too lean mixture. Adjust carburetor.

III. *Cooling System Trouble Due to Ignition.*
   A. Spark timed wrong. Time spark.
   B. Detached timer mechanism or control rods.
   C. Retarded spark—advance.

IV. *Cooling System Faults.*
   A. Insufficient water. Fill radiator.
   B. Leaky radiator. Repair and keep radiator filled.
   C. Low water level in Thermo-syphon system.
   D. Failure of water to circulate:
      1. Defective pump—clogged or pin sheared. Repair.
      2. Obstructed radiator.
      3. Obstructed hose.
      4. Clogged water jackets.

   Clean system thoroughly.
   E. Fan belt off, broken or loose. Repair.
   F. Radiator full of mud between tubes. Clean.
   G. Cold weather—water in lower radiator frozen. Cover lower part of radiator with a piece of cardboard.

V. *Other Causes.*
   A. Insufficient lubrication. Investigate lubrication.
   B. Wrong grade of lubricating oil. Consult oil companies' booklets.
   C. Brakes dragging. Adjust brakes.
   D. Green engine not thoroly run in. Run engine slowly.
   E. Valves out of time. Check up timing of valves.
   F. Valves not seating properly. Grind or check up clearance.
   G. Running on low gear too long.
   H. Carbon on cylinder head or piston. Remove head and clean carbon.
   I. Clogged muffler or exhaust pipe. Clean thoroughly.
   J. Running on low, with the wind and heavily loaded.

TROUBLE SHOOTING OUTLINE.

Mechanical Troubles.

I. *Introductory.*

II. *Loss of Compression and Power.*
   A. Loose spark plugs. Tighten.
   B. Loose relief cocks. Tighten.
   C. Loose valve caps.
   D. Leaky piston rings. Replace with leakproof rings.
      1. Rings carbonized. Gummed in recesses.
      2. Rings worn out, broken rings.
      3. Ring cuts in line.
      4. Rings losing tension.
   E. Warped valves.
   F. Valves leaking—held open by not enough clearance between stem and tappets.
   G. Scored cylinders.
   H. Loss of power from slipping clutch.

III. *Engine Knocks.*
   A. Overheated engine.
   B. Lack of lubrication.
   C. Loose valve tappets or push rods.
   D. Loose rocker arms (overhead valves).
   E. Too much clearance—tappets or push rods.
   F. Carbon in cylinders.
   G. Too rich mixture.
   H. Loose bearings.
      1. Crankshaft.
      2. Connecting rod.
      3. Wrist pin.
      4. Cam shaft.
   I. Crankshaft end play.
   J. Wind and unwind of crankshaft on six cylinder engines.

INDUSTRIAL-ART WORK OF NEW YORK CITY HIGH SCHOOLS.

Three cases arranged by girls of the Brooklyn high schools at an exhibition in the Brooklyn Institute Museum. The entire work of designing the garments, selecting and buying the materials and making the garments was done by the girls.

K. Piston slap.
L. Advanced spark on heavy pull.
M. Loose flywheel.

Note. In considering motor troubles consult:

Vacuum Oil Booklets Nos. 1 and 2. Pratt, pp. 183-194.
Hobbs & Elliott, pp. 427-452 inclusive.
Phillips, pp. 99-102 inclusive.
Page, J & A, pp. 503, 533, 671, 674.
Dyke.
Audel's Guide.
Motor Vehicles.
Marvel Carburetor company's service chart.

Charts by Page:

1. Gasoline Engine Troubles Made Easy.
2. Location of Ford Engine Troubles Made Easy.
3. Location of Carburetion Troubles Made Easy.
4. Location of Ignition System Troubles Made Easy.
5. Location of Cooling and Lubricating Troubles Made Easy.

ELEVENTH ANNUAL MANUAL ARTS CONFERENCE AT INDIANAPOLIS.

The United States Commissioner of Education has issued a call for a Conference of Men Engaged in the Training of Teachers of Manual Arts and Industrial Education, to be held in co-operation with the University of Indiana, at Indianapolis, December 9, 10 and 11.

The headquarters of the conference will be at the Hotel Severin. The program which provides for one single topic at each session, embraces the following:

First Day, Occupational Analysis and Preparation of Industrial Teachers; *Second Day*, Relation Between School and Industry, Junior Employment Service, Manual Arts in the Intermediate or Junior High School, and Special Problems of the Part-Time Teacher; *Third Day*, Occupational Training in the Army, and the Summary of the Activities of the Conference.

Each leader has been asked to prepare distribution copies, outlining the ground to be covered, and where the nature of the subject permits, formulating definite propositions, or theses, for the consideration of the Conference. Mr. W. T. Bawden will preside.

MEETING OF NEW YORK STATE TEACHERS' ASSOCIATION

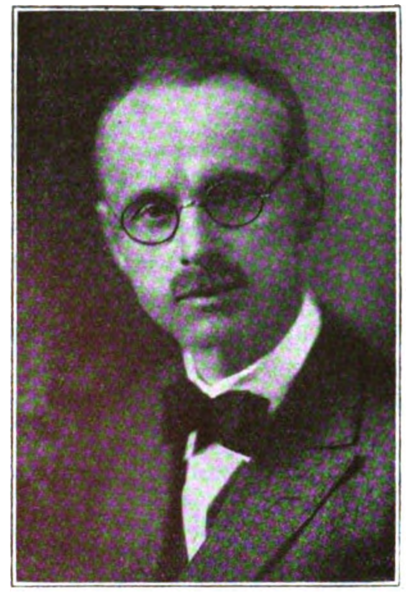
An unusually interesting program on industrial and art education was given this year at the Seventy-fifth Annual Meeting of the New York State Teachers' Association held at Rochester on Tuesday, Wednesday and Thursday, November 22, 23 and 24. Mr. James F. Barker, Assistant Superintendent of Schools at Rochester, acting as chairman of the General Meeting of the combined Fine, Industrial and Household Arts Section, held on Tuesday morning, introduced Owen R. Evans, State Director of Industrial Education of Harrisburg, Pa., who spoke on "The Social Point of View in Part-time Education," Mr. George L. Herdle, Director of the Memorial Art Gallery, of Rochester, spoke on "Present Tendencies in Painting," and Anna M. Richardson of the Federal Board for Vocational Education, Washington, D. C., discussed Homemaking Education.

Tuesday afternoon was given over to the meetings of the sections on Industrial Art and Household Arts Education. The Industrial section was in charge of Stewart F Ball, Supervisor of Manual Training at Buffalo. H. H. Stewart, Director of Industrial Arts, Mount Vernon, discussed "Industrial Arts in the Junior High School." His paper was commented on by C. C. Bush, Director of Industrial Arts, Olean, N. Y. "The Organization of Evening Industrial Classes" was the subject of a paper read by Morris Siegel, Director of Evening and Continuation Schools, New York City. William J. Small, Director of Industrial Education, Niagara Falls, discussed this paper.

The following program was introduced by Leon L. Winslow, State Specialist in Drawing and Industrial Training, Albany: "Art and Industrial Arts in the Elementary School," by Mrs. Lois Coffey Mossman, Teachers College, Columbia University; "Art Education and Industrial Demand," by Richard F. Bach, Associate in Industrial Arts, Metropolitan Museum of Art, New York City; "Developing a Market for High School Art," by Margaret Giesecke, Technical High School, Buffalo, and "A New Process in Advertising Art," by Rose Acker of the Shaefer Ross Company of Rochester. Mrs. Mossman's paper was discussed by Charles B. Bradley of Buffalo Normal School and Lillia M. Olcott of Cortland Normal School; Mr. Bach's paper by Royal B. Farnum, President of Mechanics Institute, Rochester, and Miss Acker's paper by Harry W. Jacobs, Director of Art and Handwork, Buffalo. Miss Giesecke brought with her an exhibit of craft products turned out at the Tech Studio, a co-operate students' establishment for the purpose of making a more complete correlation between school theory and its commercial application.

The following program was in charge of Mae B. Benedict, Head of the Household Arts Department, Mechanics Institute, Rochester:

Household Arts in the Junior High School, Anna M. Cooley of New York; Community Service and the Homemaking Teacher, Agnes H. Craig, Supervisor of Homemaking Education; The State-aided School and the Home Project, Marion S. Van Liew, Specialist in Vocational Education for Girls, State Department of Education, Albany.



MR. BEN W. JOHNSON,
Wilmington, Del.

BEN JOHNSON GOES TO DELAWARE.

Mr. Benjamin W. Johnson, formerly western agent for the Federal Board of Vocational Education at Seattle, Wash., has recently become Director of the Department of Vocational Education at Wilmington, Del.

Previous to accepting the appointment with the Federal Board, Mr. Johnson was Director of Industrial Education in the Seattle Public Schools. During that time he caused the department to grow from two to 56 teachers, and the work was enlarged to include all grades from the elementary thru the high school.

Mr. Johnson resigned in September, 1917, to accept an appointment on the staff of the Federal Board, which was at that time under the leadership of Dr. Prosser. His territory was the Pacific Coast region, embracing the seven states of Washington, Oregon, California, Arizona, Nevada, Utah and Idaho.

In September, 1920, Mr. Johnson resigned from the federal agency to accept appointment as Director of Vocational Education at Wilmington. The Delaware position is a combined one of State Supervisor of Trade and Industries, and Director of Trade and Industrial Education for the City of Wilmington. The city position has been created and combined with that of the state to better develop a progressive program of industrial education.

In his new work, Mr. Johnson has been placed in charge of an extensive vocational program, embracing part-time, co-operative and evening classes in vocational training, the establishment of a Day Trade School as a part of the Wilmington high school, and the inauguration of all phases of vocational work.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding **250** *words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.*

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

HAND FORGED POCKET KNIFE.

Jay F. Knowlton, Junior College Shop Instructor, Hibbing, Minn.

A pocket knife that can be made by a boy in the school shop, and still be a knife that is worth owning, is a problem hard to find. Here is one, however, that works out very well, and one that is enough out of the ordinary, to interest the most skeptical boy. It also has some very good points in its favor as a problem, such as, the working of spring steel and tool steel together, the tempering of each, the fitting of the blade to the handle, and blind riveting that will allow the blade to work in the handle.

The stock to be used for the handle should be a good grade spring steel 1/16 of an inch thick, 1½ inches wide and 3½ inches long. Such steel can be purchased from the supply houses in large sheets, and if possible, it should be obtained in the annealed state. If such is not possible, it can be handled very well in the unannealed state. This spring steel cuts very easily in a hand power shear, or when placed in the vise and cut with a cold chisel. This can be done cold, but care should be used in cutting any sheet steel in this manner as it is very liable to crack unless the cut is stopped in a drill hole. Any chisel mark left from this cutting will cause a crack when the steel is tempered. Be sure to remove all marks of such with a file before you attempt to harden. Should you not be able to find a piece of spring steel as described take a small piece of an old automobile spring and draw it out to the thickness required. This works very well except in tempering when it is necessary to experiment with it a little to obtain the best method, and to learn the grade of steel you have picked up.

As soon as your spring steel for the handle is cut to size and annealed, by allowing it to cool from a red heat while buried in lime, it should be marked as shown in Fig. 2. The drill holes should be marked with a center punch and drilled with a 5/32 drill. Now mark out the line on which to cut as shown in Fig. 3, place the piece in the vise and cut with a cold chisel starting from the outside. This will leave the work out of true and it can be heated and straightened on the anvil.

To cut this sheet steel in a vise with a cold chisel it is necessary to have the jaws of the vise parallel and a good thin sharp cold chisel. Place the steel to be cut in the vise with the line to be cut, and the top of the jaws coinciding. Now hold the chisel at an angle so that the back jaw of the vise will act as one cutter; the chisel, the other. This cutting angle should be very small so as not to bend the part above the vise any more than is necessary. If the jaw of the vise is in good condition, a very good cut can be made. Care must be used to stop the cut before a mark is made on the inside of the drill hole.

The handle can now be folded by first starting the bend with the cross piece hammer while holding the steel over the step on the anvil. Now place a ⅛ piece of steel in the center of the bend and using it as a form, bring the handle to the shape shown in Fig. 4.

Next cut the opening in the handle, which will allow the spring to be bent down while tempering, to a position lower than it will take when working. This gives the spring a chance to set before it comes to its working position. This is done by first heating the handle and raising the spring to position as shown in Fig. 5. Now cut the portion out, as shown, with a file. The length of the spring must now be marked, using dividers to get the

Fig. No. 1

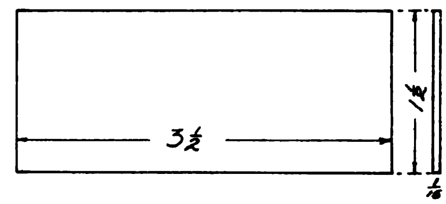


Fig. No. 2

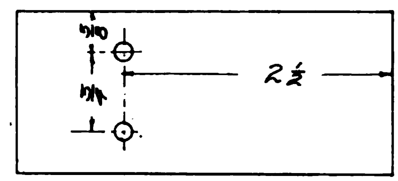


Fig. No. 3

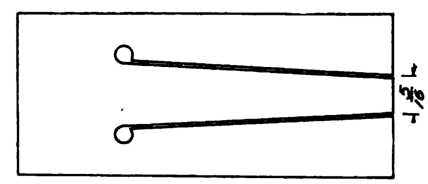


Fig. No. 4

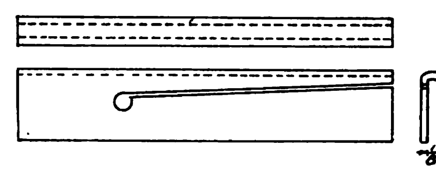
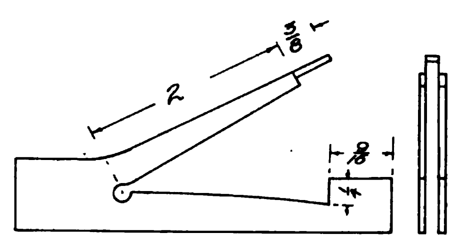


Fig. No. 5



correct length that will allow it to work in the opening you have just cut. This length should be marked a little long at first and then fitted, when bent, to position. After marking, file the end of the spring to size and shape shown, which will make the tongue ⅛ of an inch wide. Now bend the spring to its position, but do not fit it until you have put the slight curve in the frame, as shown in Fig. 6. The spring can now be fitted and the handle trimmed as shown in Fig. 6.

The blade should be made from a very good grade of tool steel. This should be better than the regular cast steel grade, and it can be purchased from any of the steel companies in sizes to suit, or it can be purchased in sheet form. The piece to be used for the blade should be ⅛ inch thick, 9-16 inch wide, and 3 inches long, from which the blade can be filed to shape and size, as shown in Fig. 7, and detailed drawing No. 11. It will be noticed that the end thru which the hole is drilled, for the rivet, is 3/8 inches square. Directly in the center of this square a ⅛-inch hole is drilled.

The filing of the part shown in Fig. 11 is perhaps the most important part of the work. It is this part that makes the blade fit the handle. This drawing will work well if

Fig. No. 6.

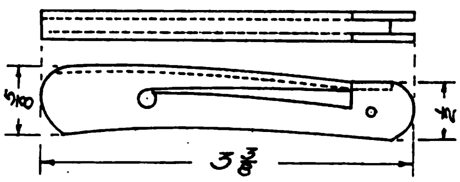


Fig. No. 7.

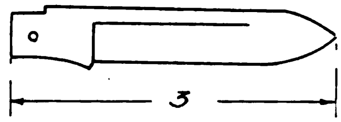


Fig. No. 8.

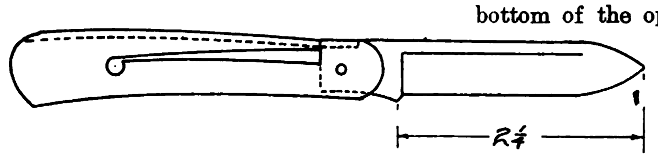
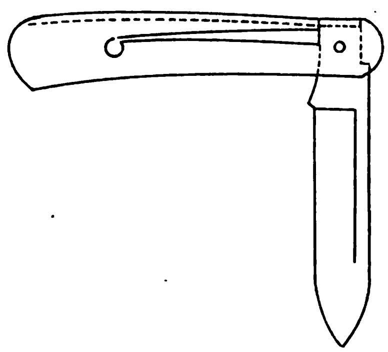


Fig. No. 9.



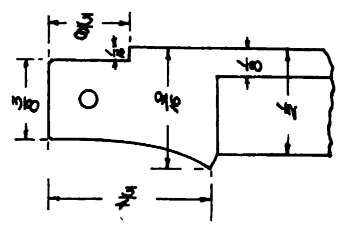
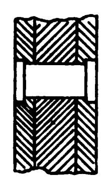
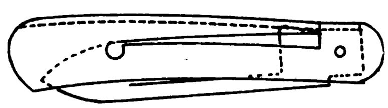


Fig. No. 11



Section Showing Rivet.

Fig. No. 10.



The Knife as made by a student.

(This Knife is slightly larger than the one suggested in the drawings.)

Fig. No. 12.

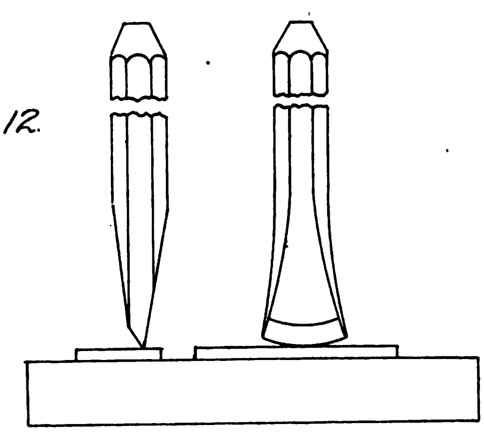


Fig. No. 13.

the handle has been given the curve shown. If the handle is a little straight this blade will not be covered by the handle but will project above. Should such be discovered before this part of the blade is filed to size, the correction can be made by moving the 3/8-inch square nearer the bottom, making a wider cut on the top and less curve at the bottom. However, keep the square 3/8 inches. If this corection is made, a portion of the blade will project above the handle, which can be trimmed off.

The rivet hole in the handle is marked from the hole in the blade. Place the blade in position on the outside of the handle, making sure that it is so placed that when the knife is finished, and blade open, that the blade and handle will be straight. To make sure of this point, the blade can be placed back a little more than is necessary, say a 1-32 or 1-64 inch, and the end of the spring can always be trimmed a little to let the blade take its proper position. Now mark the location of the rivet hole on the handle, drill with the 1/8-inch drill and counter sink half way thru each side with the 9-64 inch drill as shown in the section drawing. You are now ready to temper both.

First heat the handle and bend the spring to the bottom of the opening filed, and let it cool so as to relieve any strain there may have been formed. When it is cold, re-heat to a very low red and quench in oil until cold, then polish and draw to a blue color. The drawing can be done by first polishing it, then holding above a large red hot iron, or over the forge fire without draught, but the former will give better results to the student.

The blade is tempered in about the same way, except it is hardened at medium red and drawn to the first shades of blue. This must not be done, however, until you have cut the thumb nail hole as shown in Fig. 13. To do this, heat the blade to a dull red, place it on the anvil, and with the special tool shown in Fig. 12, cut the hole. Be sure to cut the hole on the right side of the blade, to make it a right-handed knife. Now straighten the blade, anneal and temper.

The handle and blade are now polished, placed together, blade open, with the soft steel rivet in place. Now place one piece of heavy paper between the blade and handle on both sides and rivet. Then work the blade until the paper wears out, when the blade will work freely.

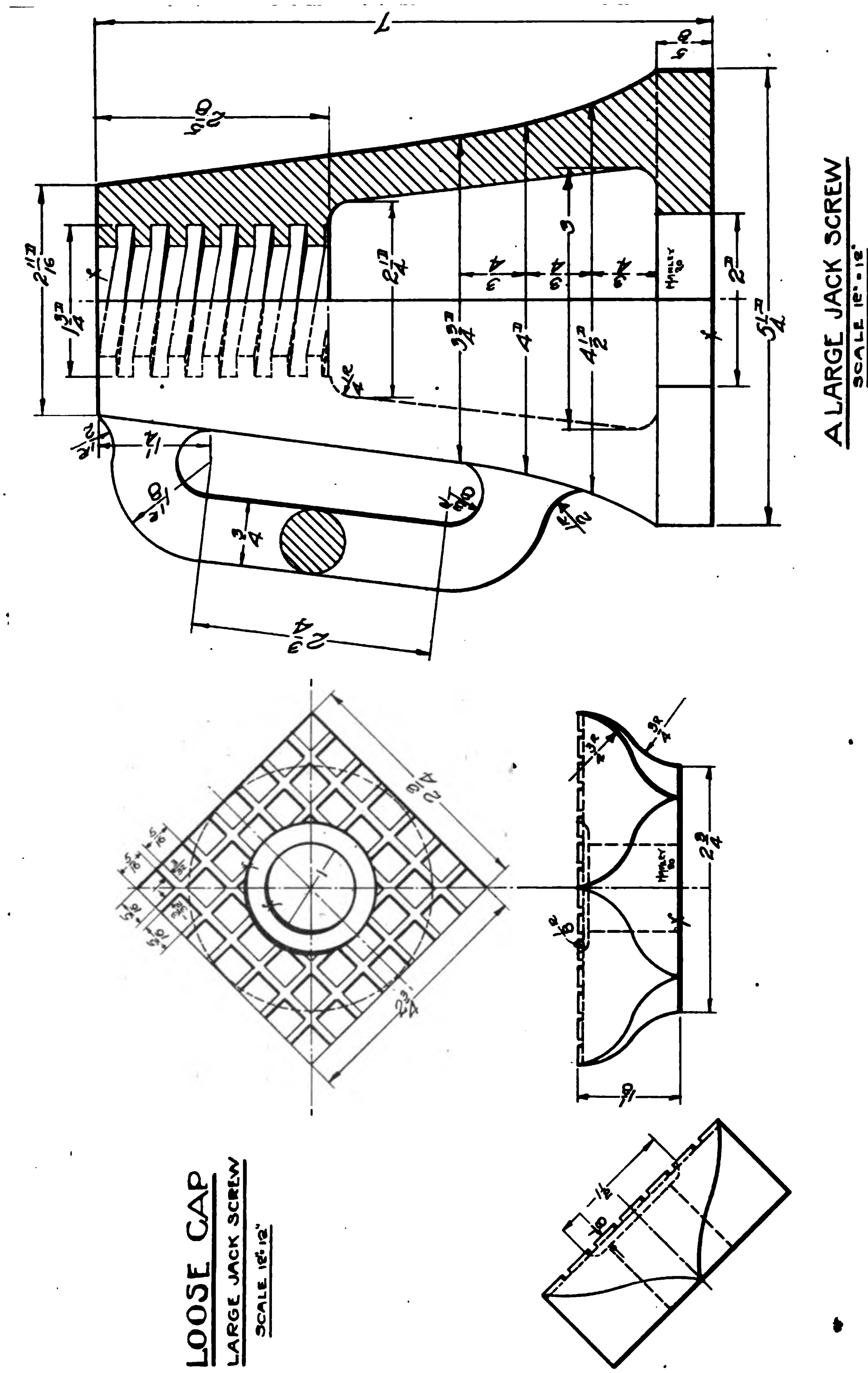
MAKING A CHECKER BOARD.

Geo. W. Berg, Bay View High School, Milwaukee, Wis.

The making of a checker board is a problem which always causes a great interest both in and outside of the manual training room, and one which requires accurate workmanship and careful gluing. There are several methods which one may use in constructing a checker board and the writer wishes to submit the following scheme or method which he has tried and found to work out very satisfactorily with high school boys.

1. Get out the following stock:

4 pieces 1x1 3/8x14" black walnut.
4 pieces 1x1 3/8x14" maple.



DETAILS OF LARGE JACK SCREW AND LOOSE CAP.

4 pieces ¾x2x17" mahogany.

2. Pass the black walnut and maple pieces thru the planer on edge, planing to 1½" in width. (Alternate cuts.)

3. Carefully glue maple and walnut pieces alternatingly. First glue two at a time, then four, and then eight. (Use blocks of scrap wood to protect glue edges. Heat pieces before gluing. Use hot glue and let pieces stand for at least ten hours.)

4. Scrape off all surplus glue and pass pieces thru the planer to ¾" thick. See Figure 1.

5. Cross-cut saw stock to pieces, 1½" in width. See Figure 2.

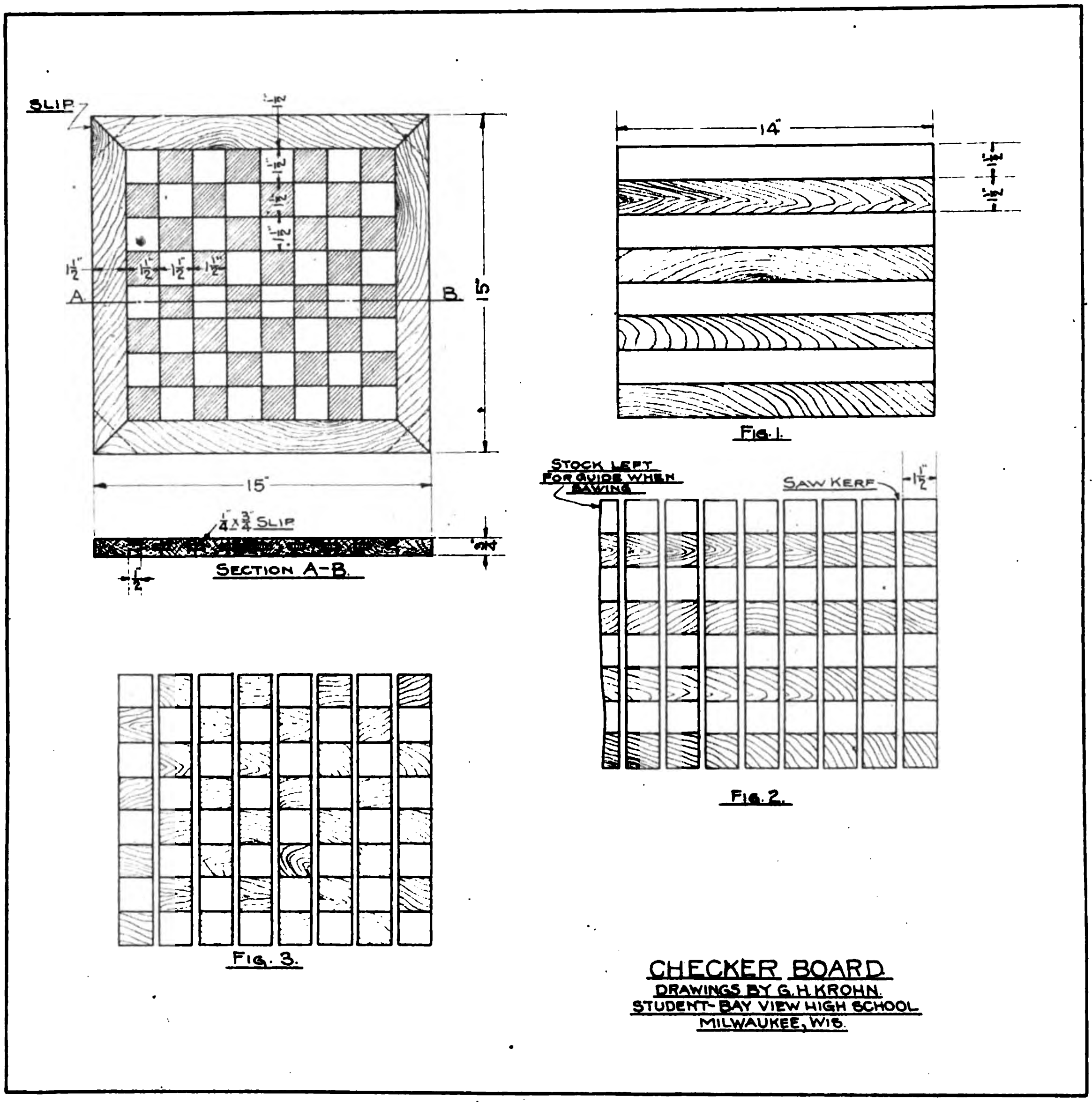
6. Turn every other piece end for end and glue. (Before gluing cut for slip ¼" thick and ¾" wide. This is done to make a stronger glue joint and to prevent slipping when gluing.) See Figure 3.

7. After glue has set hand plane both surfaces. Cut groove for mahogany moulding and scrape and sandpaper board.

8. Tongue mahogany moulding, cut mitre joint and glue in place.

9. Plane moulding to the same thickness as the board, scrape and sandpaper.

10. For a finish, rub with oil and white shellac.



DETAILS OF CHECKER BOARD.

A LARGE JACK SCREW.

E. C. Hanley, Muskegon, Mich.

The construction of the pattern for a large jack screw is simple. It forms a two part or split pattern. After the body has been turned to shape, the handle is formed from two pieces of stock which are bradded together and shaped as one piece. The ends of the handles are made extra long and recesses are cut in the body of the pattern to receive the ends.

FLOWER CORNUCOPIA.

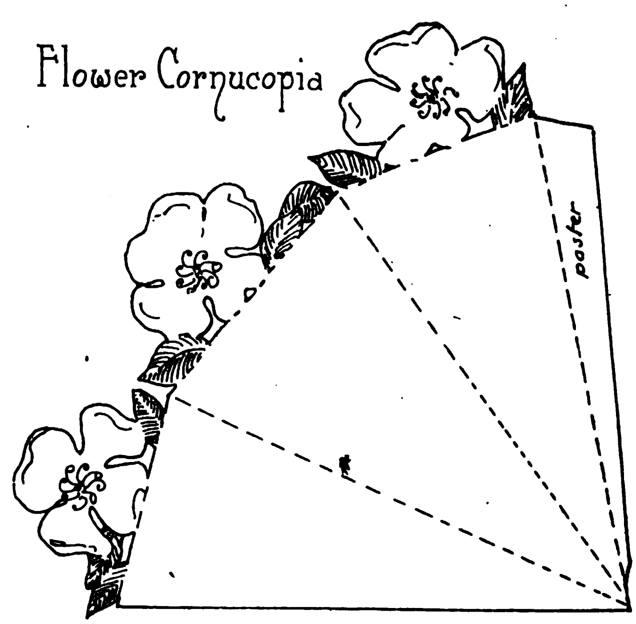
Eunice Bissell, Des Moines, Iowa.

This little dinner favor may be made of any available drawing paper or light cover stock. The cup proper may be made 5 inches long and the flowers approximately 1½ inches high. The flowers are outlined with India ink and colored with water color. After pasting the lap in place, bend the leaves outward at a sharp angle.

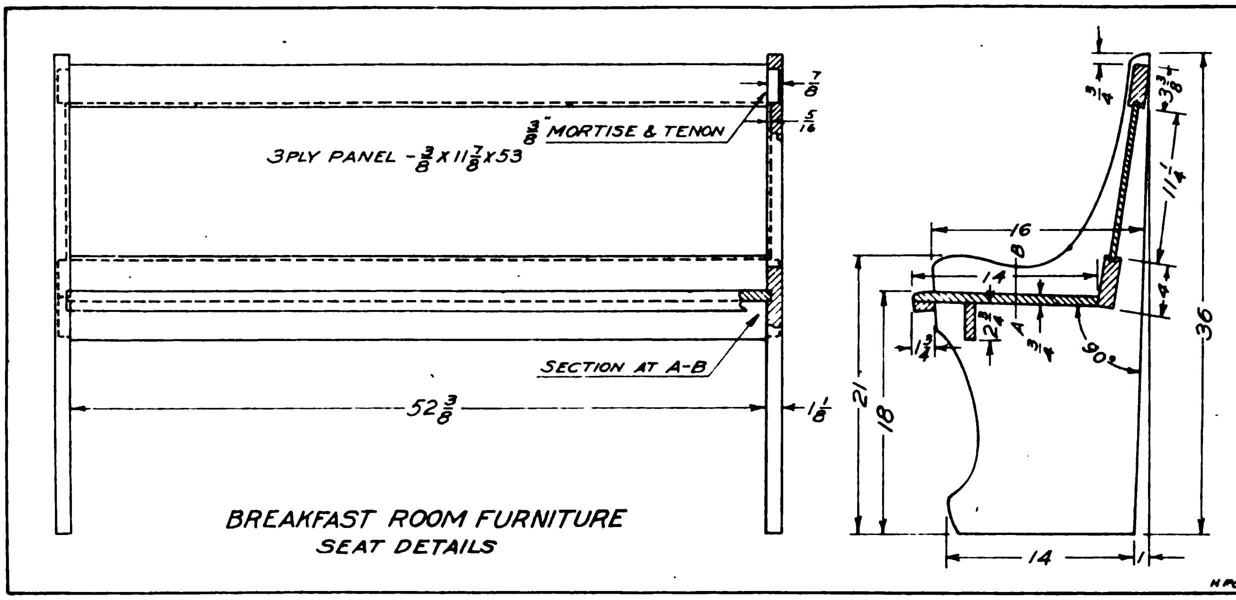
BREAKFAST ROOM FURNITURE.

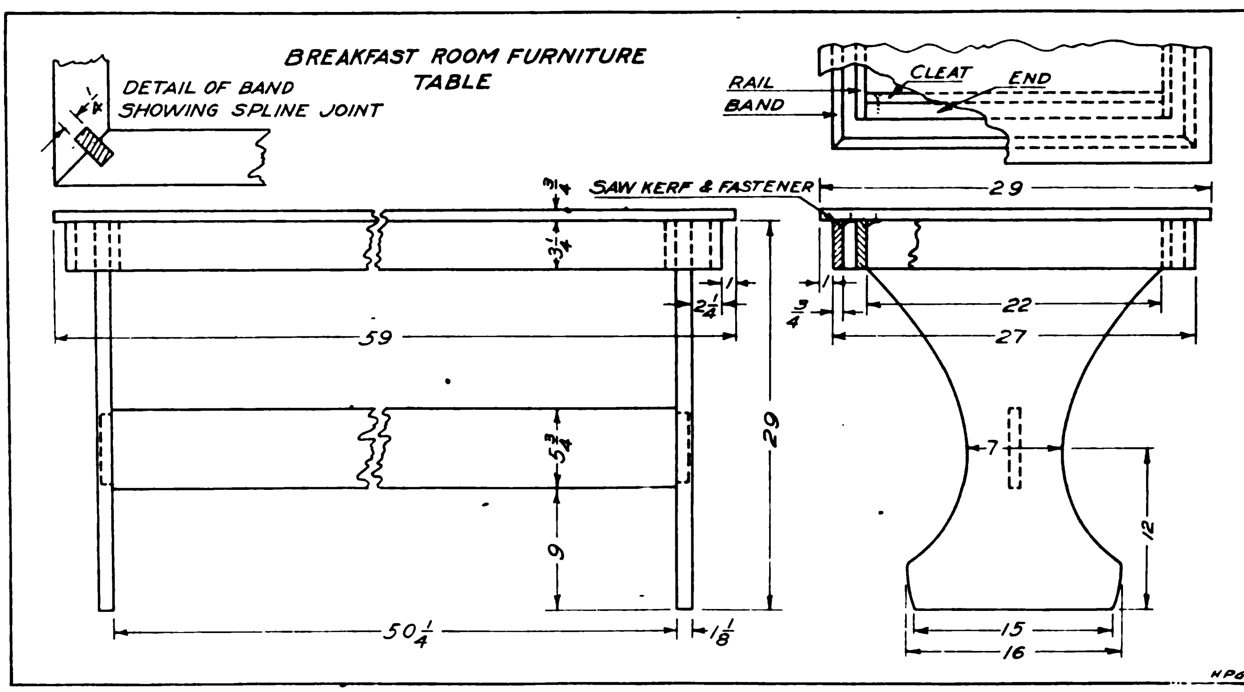
H. P. Gerber, Director Wood Working Branches, Northern Normal and Industrial School, Aberdeen, S. D.

The accompanying half tone and drawings represent a style of movable furniture that has some advantages over the built-in type. The pieces can be completed and finished in the shop, it has the built-in appearance when installed, and being fitted with glides it is easily moved to facilitate cleaning the room.



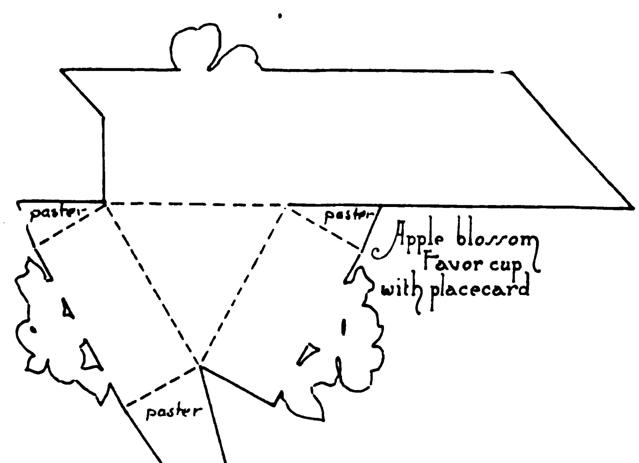
DETAILS OF FLOWER CORNUCOPIA.





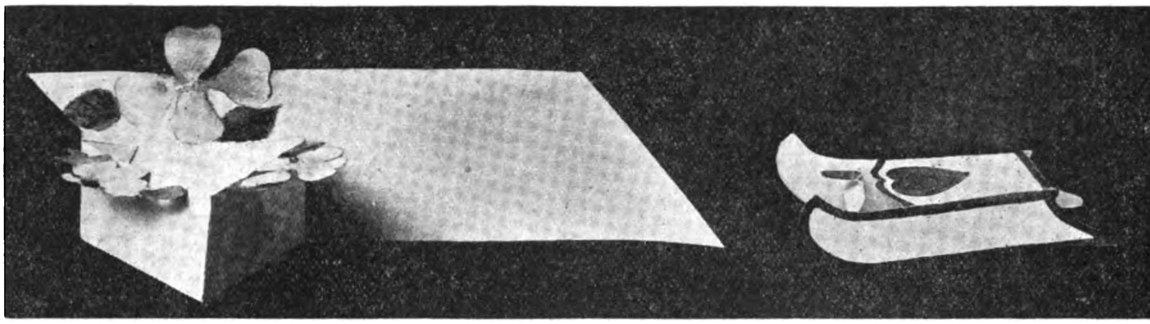
THE FURNITURE READY FOR USE.

The offset of one inch at the rear of seats was made to allow for base board and moulding. The dado to fit the seat was cut at right angles to the back, thus giving the seat a slight tilt.



DETAILS OF FAVOR CUP.

Quartered oak was used thruout and finished in a light grey shade as follows: One coat dilute Bridgeport



FAVOR CUP AND PLACE BOX. SLED SHAPED BOX.

acid stain, standard grey, sanded smooth with 00 paper, followed by one application of same stain full strength. To produce the silver grey effect the surface was then filled with a mixture of aluminum powder, a little linseed oil, and turpentine. A portion was treated and rubbed off with burlap and waste to prevent the setting of filler on the surface. After 24 hours a thin coat of white shellac was applied and later rubbed smooth with fine sandpaper or steel wool. The final finish may be either wax or flat varnish. Marietta French lacquer works well.

A SLED BOX.

Miss Catherine Richter, Des Moines, Iowa.

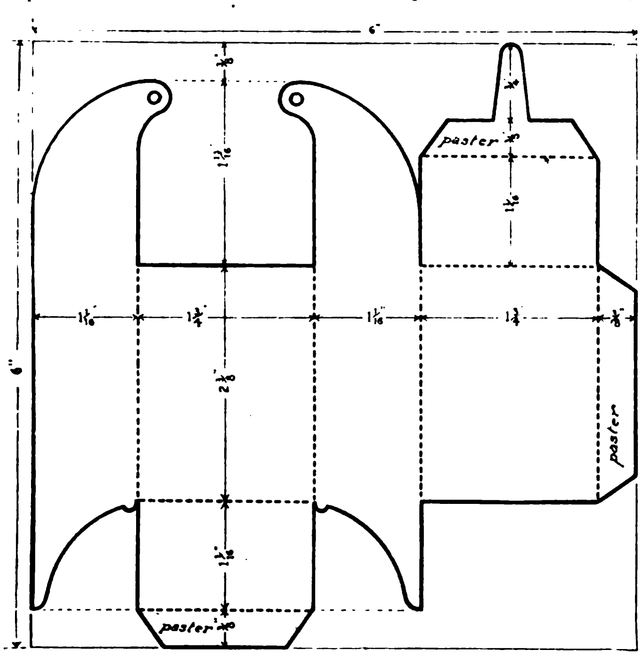
This little box can be used as a Christmas tree ornament or as a dinner favor. It is made of heavy drawing paper, but can be constructed of any medium-weight construction paper or even of light tag board.

The drawing shows the dimensions which make a satisfactory box. Any design may be painted with water colors to outline the runners and to decorate the top.

A FAVOR CUP.

Eunice Bissell, Des Moines, Iowa.

This little cup will serve both to hold favors and as a place-card for a luncheon. It may be made of heavy



DETAILS OF SLED SHAPED BOX.

drawing or construction paper and may be colored to suit the fancy of the maker. In the example illustrated in the photograph the blossoms were pink and the background of leaves was indicated with green.

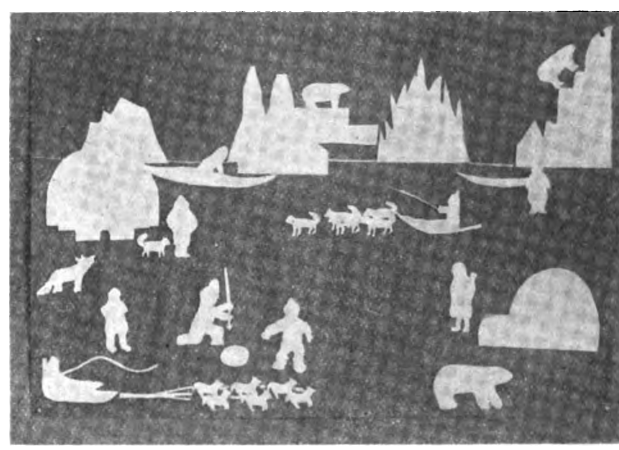
COMMUNITY POSTERS.

Grace W. Engels, Newark, N. J.

It will be found that the child has a much more intelligent idea of the geography or history lesson if he is allowed to represent those things that he has been talking about with cut paper. The aim should be of a simple representation of the child's idea of a particular thing and therefore details should be avoided. Silhouettes are most effective for this as the child is not confused by many small cuttings.

I have found that the community poster brings forth more enthusiasm and interest than the individual poster.

Many intelligent questions are asked by the children when cutting and placing the objects on the poster that lead to discussion on many important phases of the work that have been overlooked when the lesson was taught.



ONE OF THE COMMUNITY POSTERS.

The basis for these posters were pictures and stories presented to the class in which the habits and customs of the people were brought out. After being retold by many members of the class, the individual freehand cuttings were made and a selection was made by the class for the community poster.

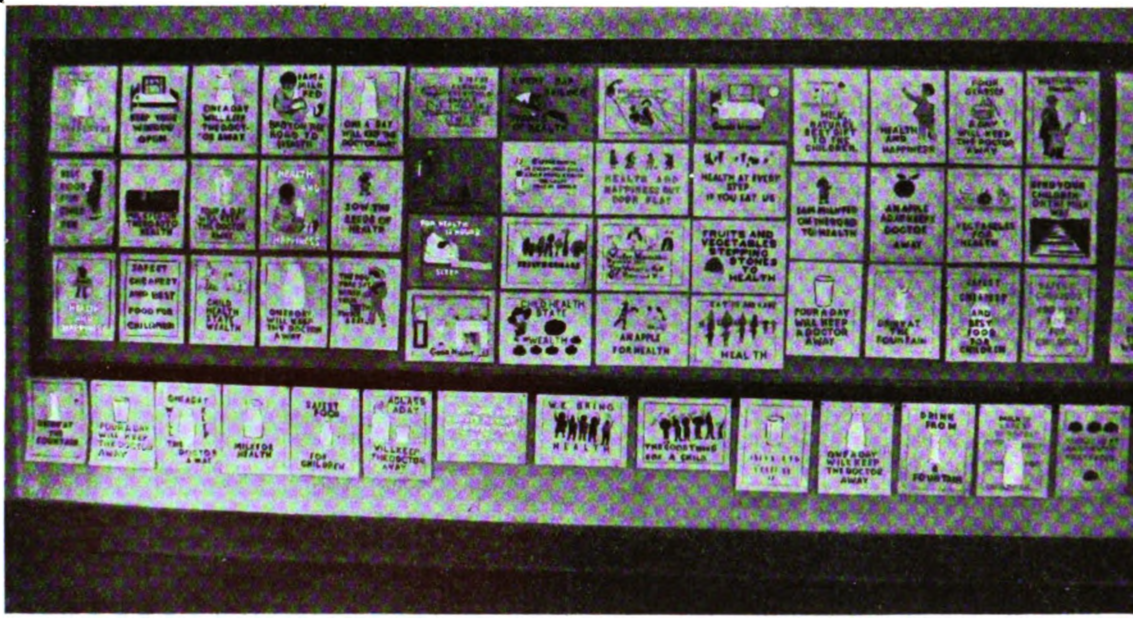
The backgrounds used were sheets of dark blue and black papers 36" by 24" in size and the cuttings were made of cheap white paper. Altho the better cuttings were selected, every member of the class was represented in some way so as to make a real class project.

HOW TO TELL BIRCH, BEECH, AND MAPLE

Birch, beech, and maple are very similar in appearance, and have approximately the same weight. Hence it is comparatively easy to mistake one of them for another. A method which anyone can use to distinguish them is suggested by the U. S. Forest Products Laboratory. The method makes use of the relative width of the pores and medullary rays in the three woods.

If the end grain of birch, beech, or maple is cut smooth with a sharp knife and examined with a hand lens, the pores will be seen as tiny holes distributed fairly evenly over the surface, and the medullary rays will appear as narrow lines of a different shade running at right angles to the growth rings.

In beech some of the rays are very distinct even without a lens. The large rays are fully twice as wide as the largest pores.



PART OF POSTER EXHIBIT PREPARED BY PUPILS AT MUNHALL, PA. PREPARED UNDER DIRECTION OF SUPT. C. R. STONE.

In maple the rays are less distinct, and the largest are about the same width as the largest pores.

In birch the rays are very fine, invisible without a lens. The pores are several times larger than the rays, usually being visible to the unaided eye as minute holes on the end grain and as fine grooves on dressed faces of the board. The pores in birch are considerably larger than the pores in beech or maple.

The appearance of the medullary rays on a "quartered" surface is also distinctive. Here they appear in beech as distinct "flakes", the largest being between one-sixteenth and one-eighth inch in height when measured along the grain of the wood. In maple they are considerably smaller, rarely attaining a height of one-sixteenth inch. In birch they are comparatively inconspicuous.

AN INTERESTING HEALTH EXHIBIT.

The schools of Munhall, Pa., with the co-operation of the State College, held an interesting health exhibit this year. The exhibit, which took the form of a "drink more milk campaign," consisted of displays of sample meals. Illustrated talks on nutrition were given to interested groups of students. A prize poster competition was conducted under the direction of the art supervisor and generous prizes were given by the local milk companies. Some of the posters read: Better Food, Less Expense; An Apple a Day Keeps the Doctor Away; One Quart a Day Will Keep the Doctor Away; Safest Food for Children; Drink at the Fountain.

Groups of parents were in charge of the preparation of "model" meals which held the interest of both cooks and visitors. The largest attendance of patrons was that for the concluding program of the afternoon.

A contest for the best made-over garments, in the interest of thrift, also took well.

SECTION OF HEALTH EXHIBITION AT MUNHALL, PA.

IMPORTANT EDUCATIONAL PROGRAM IN ILLINOIS.

The Industrial Division of the Illinois State Board of Vocational Education, during the past year, has promoted the establishment of part-time continuation schools, part-time trade extension schools and evening trade extension schools. The part-time continuation school is the most important of the above three types of schools, not merely because the law requires that boards of education shall establish such schools or classes, but because of the valuable service which they render the state.

Part-time continuation schools may be established under the optional mandatory law which makes it possible for boards of education to establish a continuation school, and to compel attendance of all persons between the ages of 14 and 16 years who do not attend full-time schools.

Part-time schools must be established in 1921 in districts where there are at least twenty minors between 14 and 16. The upper age limit is gradually extended to 18 years in 1923, so that more and more school districts will be included in the provisions.

It is requested that before boards of education begin to plan for more classrooms and additional equipment, that they take a census for the purpose of obtaining information about (a) each child, (b) the number of children expected to attend in 1921, 1922 and 1923. This information is recorded on a census card which lists the name and birthplace of the child, the names of the parents and occupation of father, street address, school district, date of child's birth, age at last birthday, school attended, grade reached in school, cause of non-enrollment, where employed, name of employer, and kind of work performed.

The following thirteen districts have formally voted to establish continuation schools under the "optional-mandatory" law: Aurora, east and west sides; Bloomington; Chicago; Cicero township high school; Eldorado township high school; Galesburg; Granite City community high school; Joliet township high school; Lawrenceville township high school; Peoria; Rockford; Springfield.

Teacher-training centers are planned thruout the state for the purpose of giving teachers in part-time schools some special instruction to assist them in fully appreciating and understanding the special problems of these schools. The training centers will be located at points that will best serve the interests of cities conducting part-time schools this year.

THE MIDDLE WEST ASSOCIATION IN MINNEAPOLIS, FEBRUARY 9, 10 AND 11, 1921.

The Vocational Education Association of the Middle West has a paid membership of more than 600. They come in goodly numbers from all the middle states, with a few from practically every state.

Most of these members, already familiar with the spirit and quality of this Association and its programs, will attend the Minneapolis meeting without fail. And there will be hundreds of new members from the Great Northwest seeking the assistance of this notable meeting and bringing fresh messages and enthusiasm from their particular section.

This is the first time in recent years that an organization of national significance has held its meeting in a convenient place for the interested people of Canada. Advance information comes that Canada will send a large delegation with an interesting message for vocational workers in the United States.

Under the rapid-fire and enthusiastic leadership of Mr. Edwin A. Lee of the University of Indiana, the best program in the history of this organization is in process of construction. Already sufficient arrangements have been made to indicate that this year's program will equal any program ever given in this country on the subject of Vocational Education. National figures from both Canada and the United States will have places on the program and will present such matters as should not be missed by any school, industrial, or commercial people who are interested in training for workers and especially by those who have the responsibility of putting it into operation.

Vocational people, especially in the Middle West and the Northwest, should immediately get in touch with Chambers of Commerce, Women's Clubs, Rotary Clubs, Welfare Organizations, Labor Organizations, etc., and urge them to send official delegates to this great meeting. There will be something going on all the time of vital interest to all these groups.

In the preparation of the program, particular care has been used in securing speakers who can bring authoritative messages to the various school people, labor representatives, agricultural groups, those interested especially in the work of women and girls, child labor specialists, truancy and attendance officers, etc., etc.

It goes without saying that this will be the great opportunity for superintendents and principals of schools to secure aid in the solution of some of the pressing problems that are now facing them in the execution of the new legislation on vocational education and part-time schools. The specialists in all these various fields of education should bring this opportunity strongly to the attention of their school administrators and urge their attendance.

One significant indication of the importance of this meeting is the fact that the commercial establishments very early contracted for all the available space for commercial exhibits in the headquarters hotel. These represent commercial interests from every section of the country.

It will be a great meeting in Minneapolis and every person who can possibly attend should be there for the entire session. Meet all your old friends there and make a lot of new ones.

THE ILLINOIS HIGH SCHOOL CONFERENCE.

The annual Illinois High School Conference was held at the University of Illinois November 18, 19 and 20. The Manual Arts section was probably the largest in the history of the Conference, numbering approximately one hundred and twenty-five.

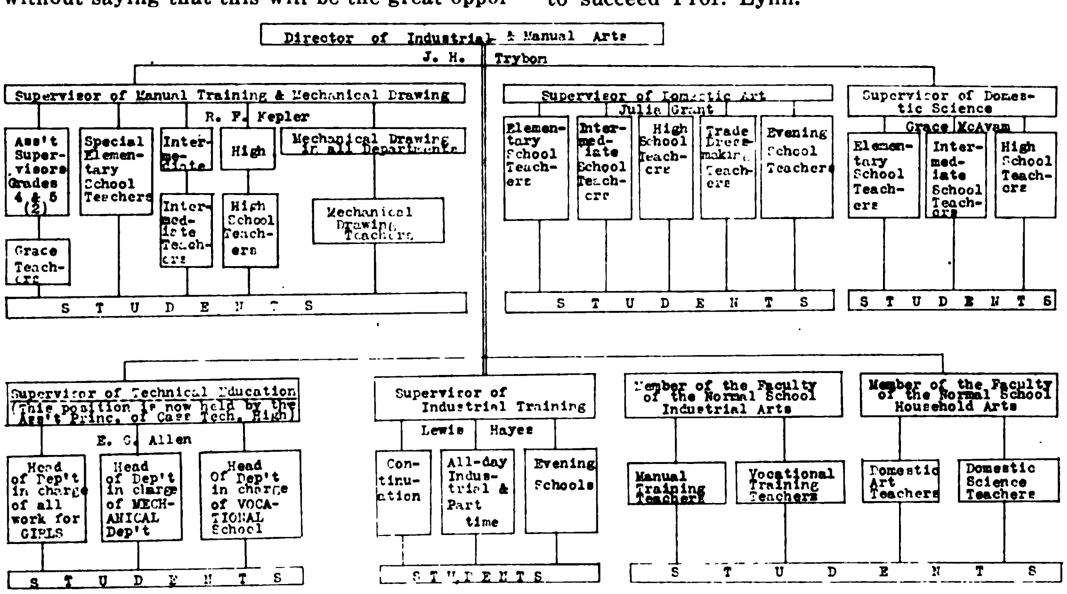
The principal discussions on the main program were "Curriculum Reconstruction," by Mr. Arnold Lau, Principal of the High School, Rock Island, Ill.; "Productive Work in the Manual Training Shop," by Mr. R. L. F. Biesemeier, Kenilworth, Ill.; "Relation of Art and Manual Training Courses," by Mr. L. A. Tuggle, Danville, Ill.; "Libraries for Manual Arts Teachers," by Mr. C. H. Dalton, Lovington, Ill., and "Continuation Work and Its Relation to Manual Arts," by Mr. S. J. Vaughn, University of Illinois.

An afternoon session, presided over by Mr. Vaughn, was given up wholly to a round table discussion of the newer phases of industrial and vocational education. The art teachers met at the same time for a round table discussion of their particular problems. Professor E. J. Lake of the University of Illinois conducted the round table.

A most encouraging phase of the general meetings of the entire Conference was the emphasis, both in point of time and in interest, which was placed upon the problems connected with the part-time school work in Illinois. School people have apparently just begun to realize the magnitude of the problem which the part-time work presents and they manifested great earnestness in seeking information and guidance at this Conference.

Mr. J. V. Lynn, formerly Supervisor of Trade and Industrial Education with the State Board, goes to Iowa State College as Associate Professor in the Department of Vocational Education, and will organize the new program.

Mr. Harvey L. Freeland of the East High School, Minneapolis, has been appointed State Supervisor in Iowa to succeed Prof. Lynn.



ORGANIZATION OF THE DETROIT INDUSTRIAL AND MANUAL ARTS DEPARTMENT.

The administrative and supervisory machinery of the Department of Industrial and Manual Arts of the Detroit city school system is made clear in the above chart. In the upper groups is included the older work of manual training, domestic arts and domestic science; in the lower groups are expressed the vocational and teacher training activities of the secondary, special and normal schools.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Textbooks.

133. Q:—Will you kindly advise me where I can get the textbooks on cabinet making, together with their prices, which are mentioned in your article "Reconstruction Courses" on Page 446 of the November issue of the Industrial-Arts Magazine?—*H. L. P.*

A:—The several books mentioned in Mr. Miller's article in the November issue of the magazine may be obtained as follows: *Wood Carving*, Thos. C. Simmonds, $0.50, Manual Arts Press, Peoria, Ill.; *The Hardwood Finisher*, F. T. Hodgson, $0.50, David McKay, Philadelphia, Pa.; *Furniture for the Craftsman*, P. D. Otter, $1.50, U. P. C. Book Co., New York City; *Effective English*, Claxton & McGinnis, $1.25, Allyn & Bacon, Boston; *Vocational Mathematics*, W. H. Dooley, $1, D. C. Heath & Co., Boston; *Furniture Designing and Drafting*, A. C. Nye, $2, Wm. T. Comstock Co., New York City; *Shopwork*, Rush-Conway, $1.20, Industrial Book & Equipment Co., Indianapolis, Ind.

Tin Can Toys.

134. Q:—Where can I find books on making toys from tin cans?—*G. G. H.*

A:—*Thatcher's Making of Tin Can Toys*, $1.50. Lippincott Co., Philadelphia; *Williams' Tin Can Toys and How to Make Them*, $2.50. C. Williams Co., 5454 Page Ave., St. Louis, Mo.

Wood Carrying Texts.

139. Q:— Please inform me where I can obtain books and magazines on wood carving.—*R. R. V. S.*

A:—*Woodsend's Practical Wood Carving*. $1, U. P. C. Book Co., New York; *Rowe's Practical Wood Carving*, $3, Manual Arts Press, Peoria, Ill.; *Hodgson's Wood Carving*, $1, Building Age Book Dept., New York; *Jack's Wood Carving*. $1.40, D. Appleton Co., New York; *Simmonds' Wood Carving*, $0.50, Manual Arts Press; *Hodgson's Easy Lessons in Wood Carving*, $1.50, Periodical Publishing Co., Grand Rapids, Mich.; *Jackson's Wood Carving*, $1.20, Chas. Scribner, New York; *Moller's Wood Carving Designs*, $2.50, American Architect, New York.

NEW BOOKS.

Furniture for Small Houses.

By Percy A. Wells, head of the cabinet department, Shoreditch Technical Institute (England). Cloth, royal octavo. E. P. Dutton & Co., New York, N. Y.

This book presents a series of very simple, well-designed pieces of furniture intended for the small house occupied by the family of limited means. While many of the articles are just a trifle quaint from the standpoint of the United States, they are all very practical and can be made by any boy of high school age. In fact, the designs were developed and a full set of the pieces as suggested, was made in the cabinet shop of the London school with which the author is connected.

Technique of Practical Drawing.

Edward S. Pilsworth. Cloth, 12mo., 150 pages. The Macmillan Co., New York.

This book presents in simple, direct form the technique of drawing for reproduction by the photo-engraving process. The text does not enter at all into such important elements of drawing as design, perspective, etc., but limits itself strictly to the mechanics of drawing with the pencil, with the pen and with the brush. In the introductory chapter the nature and value of commercial art and the elements of representing form are explained. Each of the subsequent chapters takes up in detail the materials and tools, the delineation of outlines, shadows, and the other details of the correct and effective use of pencil, pen, crayon, and brush. Much practical information is given concerning well established methods, or "tricks of the trade," the methods of zinc and half-tone photo-engraving, the making of silver prints, special requirements in drawing for block-out and vignetted cuts, etc.

The book is especially valuable for school use because it brings together much information on commercial art practice which the average teacher overlooks entirely, or at least makes light of, in teaching the elements of drawing. The book is simply but amply illustrated.

Toy Patterns.

Michael C. Dank. Portfolio, 10½x14". Manual Arts Press, Peoria, Ill.

The present portfolio contains twelve sheets of full-size patterns for nineteen different toys—mostly suitable for direct copying and reproduction, with the coping saw. The toys emphasize children's love for humor and interest in motion. They are suitable for reproduction in the school or the home shop and should find wide use.

Four of the sheets have appeared in the problems department of the Magazine.

Educational Toys.

Louis C. Peterson. Boards, royal octavo, 113 pages. The Manual Arts Press, Peoria, Ill.

This book presents a collection of most interesting toys made of thin wood with the coping saw. The collection is the cream of a great number of toys made in the Model Practice School, at the Illinois Normal University (Carbondale), and includes only toys which have been subjected to the test of (a) adaptability to child powers, (b) interest, (c) educational value, (d) correct light-wood construction, and (e) adaptability to ordinary school-shop conditions. The author has carefully outlined correct methods of using the coping saw and other small tools and has added to each of the working drawings directions for overcoming the especial difficulties of construction. Three toys in heavy wood are added at the end of the book.

PUBLICATIONS.

How Teachers May Use Publications on the Control of Diseases and Insect Enemies of the Home Garden. Alvin Dille. Circular No. 68, 1919, U. S. Department of Agriculture. The pamphlet discusses topics for study, illustrative material. practical exercises. and correlations.

Forestry Lessons on Home Woodlands. By Wilbur R. Mattoon and Alvin Dille. Bulletin No. 863, 1920. U. S. Department of Agriculture. The lessons in the pamphlet present the subject of farm forestry from the standpoint of the important local kinds of forest trees and their uses, the location of woodlands on the farm, the economic value to the farm, utilizing timber, protection and improvement, and the planting of young timber. It discusses forest trees and forest types, location and extent of woodlands, economic value of forest, products from the forest, use of timber, measuring and estimating. marketing, protecting the woods, improving the home forest by cutting, woodlands and farm management.

Lessons in Plant Production for Southern Schools. Prepared by E. H. Shinn, assistant in agricultural education. Bulletin No. 53, Series No. 6, 1920. Issued by the Federal Board of Vocational Education. The lessons in this bulletin are intended to be adapted to the seasonal, agricultural, and school conditions of the states represented in the southern region. It discusses the selection of the project, the weekly program, crops, home garden, soils, insects, orchard, weeds, farm accounts, roads, small fruits, forage, fertilizers, and management suggestions.

Army Lessons in English. Parts I, II, III, IV, V, VI and VII. Prepared by Garry C. Myers. Issued by the Recruit Educational Center, Camp Upton, N. Y. These volumes are intended to teach the recruit to speak, read and write good English and to become a good American citizen. The men are taught to express themselves and to state intelligently what America stands for and what the government offers her citizens.

The American toy making industries value their output this year at $80,000,000. The total sales will reach the sum of $100,000,000. It is believed that the competition manifested by Germany and Japan before the war, and likely to assert itself again in the near future, can be combatted successfully owing to the introduction of machinery and the economies effected in quantity production.

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SUBSCRIPTION INFORMATION

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EDITORIAL CONTRIBUTIONS

The Board of Editors invites contributions of all kinds bearing upon the Industrial-Arts Education, Manual Training, Art Instruction, Domestic Science, and related subjects. Unless otherwise arranged for, manuscripts, drawings, projects, news articles, etc., should be sent to the Publication Office in Milwaukee, where proper disposition will be made. The Board of Editors meets each month, and all contributions submitted are given careful attention. Contributions when accepted are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

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MEANWHILE, if these hours be dark, as indeed, in many ways they are, at least do not let us sit deedless, like fools and fine gentlemen, thinking the common toil not good enough for us, but rather let us work like good fellows, trying by some dim candle-light to set our work-shop ready against to-morrow's daylight—that to-morrow, when the civilized world, no longer greedy, strifeful, and destructive, shall have a new art, a glorious art, made by the people and for the people, as a happiness to the maker, and the user.—William Morris.


The Side Door
H. W. JACOBS

INDUSTRIAL-ARTS MAGAZINE

Volume X FEBRUARY, 1921 Number 2

PENCIL SKETCHING

Harry W. Jacobs, Director Art Education, Buffalo, N. Y.

PRACTICALLY everybody uses a pencil as a means of graphic expression and the vocations that use the pencil daily as a principal tool will number into the millions. Of this latter group probably five hundred thousand use the pencil in a professional vocation. Few have studied the art of pencil drawing or sketching as a simple, inexpensive and expressive means of representation in their chosen professional lines.

The charm of pencil sketching or pencil painting lies in its power to suggest the many qualities that are found in other mediums. The crisp painted-like strokes produce results and make the pencil the medium of general understanding.

MATERIALS.

Pencils.

Pencils are made in seventeen grades, ranging from the hardest 9H to the softest 6B. From this wide range of graded values I have selected six grades, namely: 3H, H, HB, B, 2B, 3B. Using white—the tone of the paper as a value—because it must always be reckoned with, we have six steps of values to deal with, as shown in the scale at top of Plate A. From this range of pencil values, we must be able to decide which values are best suited for our particular drawing or sketch.

The best grade of pencils should be secured, since they are free from grit and give an even, firm tone of desired value.

In sharpening the pencils care should be taken in not allowing too long a lead to protrude as in No. 5, Plate A, as it will quickly break under firm pressure. About one-quarter inch of lead will give a satisfactory point. (No. 6, Plate A.)

After it is sharpened, the lead is rubbed down on a piece of practice paper, the pencil being held in a natural position for drawing, at about a 45 degree angle. (Examples of points Nos. 2 and 3, Plate A). Sandpaper is sometimes used in wearing down the point, but the pencil should be finally rubbed on paper to insure an even marking surface. No. 4, Plate A, shows the position of the pencil for fine lines or accents in the sketch. A pencil of 2H grade should be sharpened as in No. 1, Plate A to be used in sketching lightly the leading lines of your drawing.

Paper.

The paper should be of a good quality and have a slight grain. Papers with a high or glossy finish should be avoided as well as those with a rough surface, as the strokes cannot be handled to the best advantage on either. The drawings illustrating the text were made on two kinds of paper. Plate A on 2-ply Strathmore and Plates B and C on an off-set paper which can be obtained at any large paper house. Both are durable and have a firm and slightly grained surface, over which the pencil runs smoothly. Regular 9x12 white drawing of good quality, that is used in most schools, is a satisfactory paper.

All beginning work should be drawn on 9x12 paper, gradually increasing the size to 11"x14" as the work progresses, which allows a greater white space about your drawing as the size of your subject increases.

Erasers.

The eraser is an undesirable element in the work, as the pencil strokes lose their crispness over surfaces where the eraser has been used. However, in removing construction lines and correcting minor errors a soft white eraser is necessary. For removing a portion of the sketch, the kneaded eraser is the less destructive to the surface of the paper.

Portfolios or Drawing Board.

The drawing paper may be thumbtacked on a drawing board or held on a portfolio by elastics. It is always well to place several thicknesses of paper under your drawing sheet to insure an elastic surface or one that will give with the firm pressure of the pencil.

PRACTICE STROKES.

Pencil rendering is not difficult if approached in an orderly manner. It is the directness of stroke, the laying on of pencil strokes at first hand correctly, that gives atmosphere and life to the sketch. The laying on of the pencil strokes is mastered only by constant practice in making firm, even lines and massing of the strokes, as to give an even, firm tone of the desired quality. It is the "ironing out" of the paper with the

With the many mediums of graphic expression that are now in use in our Secondary Schools, too little stress and importance is placed on the pencil as the universal medium of expression. These illustrated articles on the technique of pencil sketching offer to teachers and pupils a systematic course in this subject, with the hope that both teachers and pupils will acquire an avocation that has a direct bearing on their particular vocation.

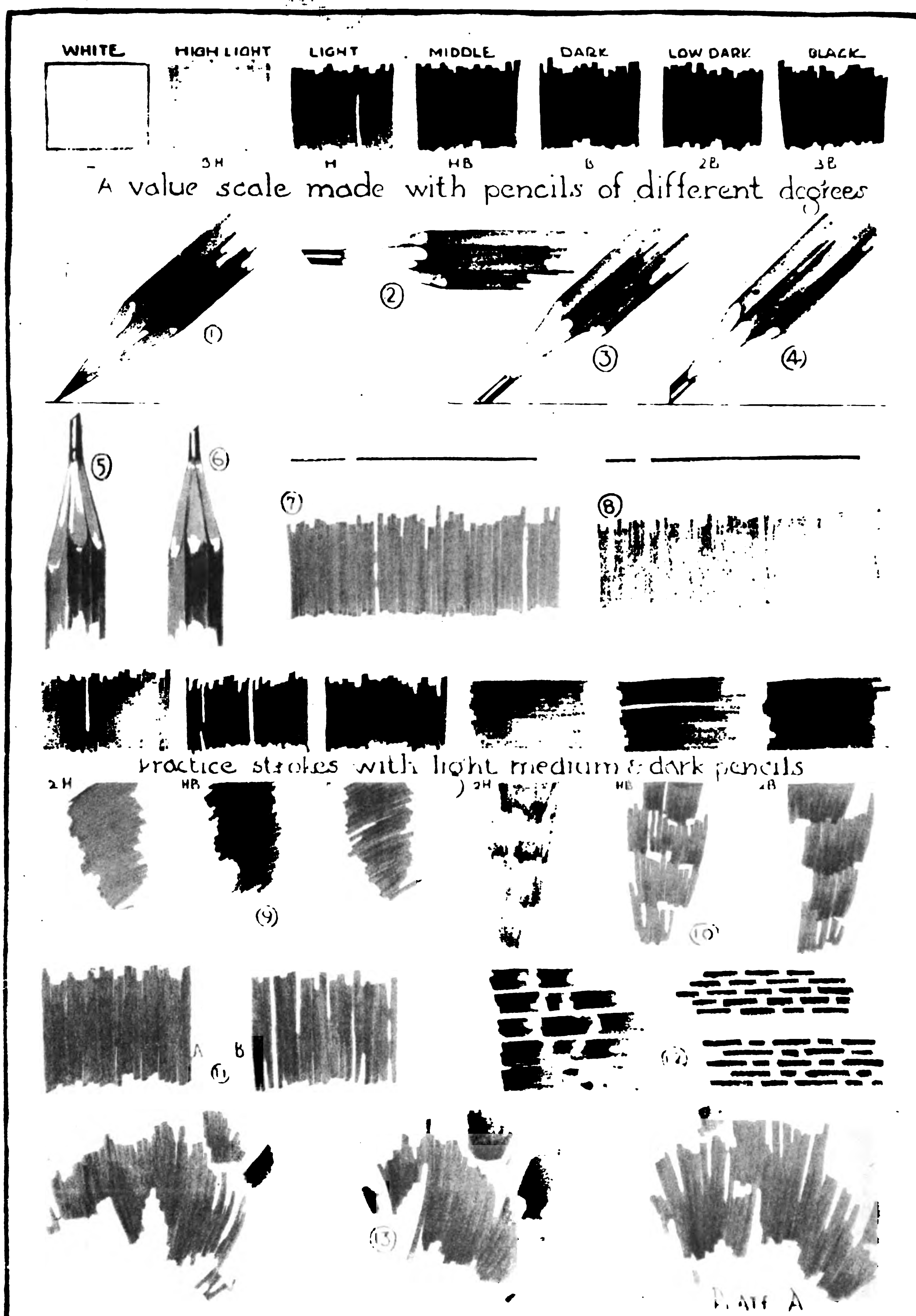
WHITE
HIGH LIGHT
LIGHT
MIDDLE
DARK
LOW DARK
BLACK
3H
H
HB
B
2B
3B
A value scale made with pencils of different degrees
practice strokes with light medium & dark pencils

PLATE A.

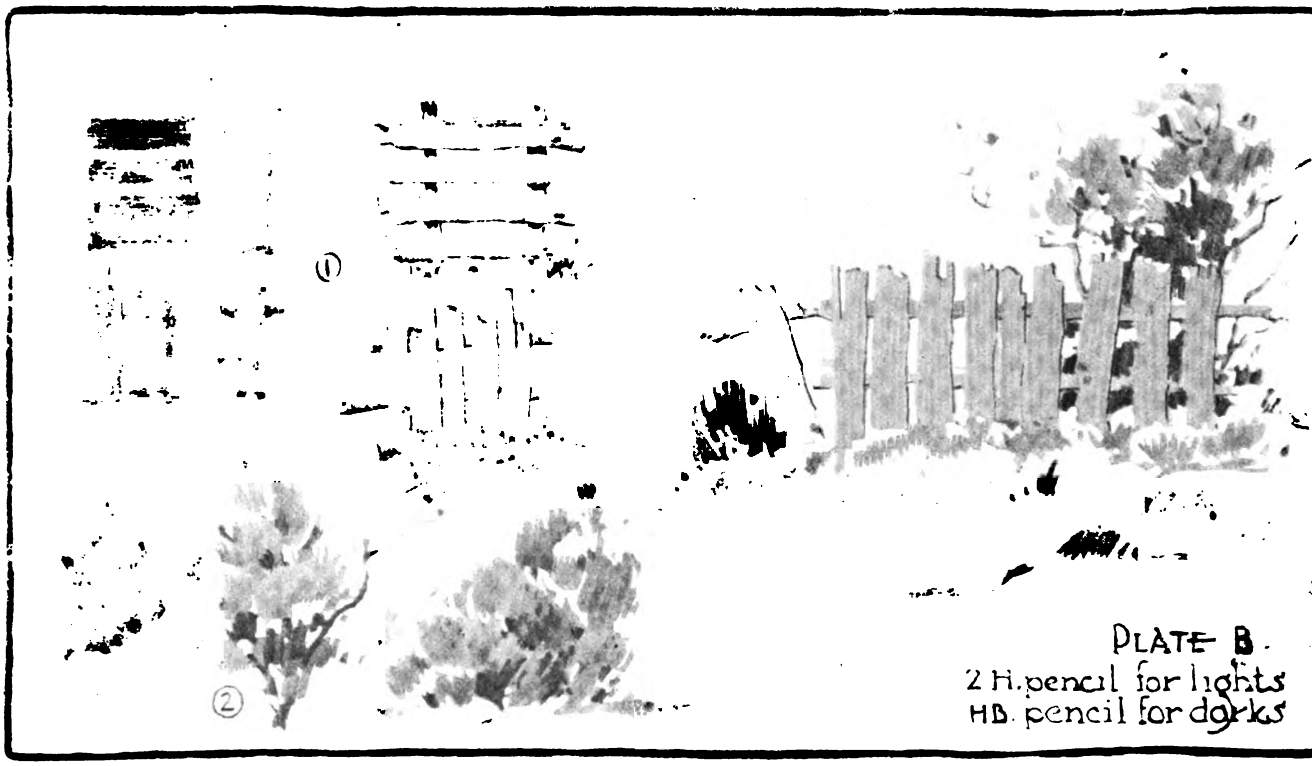

PLATE B.

lead that gives the flat tone effect, No. 7, Plate A. No. 8 shows a woolly stroke due to lack of pressure, thus not obtaining the value of the grade of pencil used.

It is well to begin the practice strokes with three grades of pencils, 2H, HB, and 2B, light, medium and dark, respectively, and lay such strokes as are shown on Plate A, first the vertical strokes and second the horizontal strokes made with each grade of pencil. These strokes are drawn with directness and vigor and are not worked in a laborious manner, keeping in mind that all strokes should receive full pressure and begin and end in a crisp painted-like stroke.

Strokes shown by No. 9 are drawn from lower left to upper right, giving a slanting stroke. These may be drawn downward in the same manner or by not lifting the pencil but allowing it to work over the paper producing a series of slanting strokes from left to right or vice-versa.

Number 10 shows a series of short strokes worked together into a suggested mass form. These are built with a downward stroke and are used in foliage and in shingles and rough boarding.

Number 12 shows the rendering of stones and brick, built together in a wall arrangement. In the first rendering the strokes are of uneven lengths because the stones are of irregular size and shape while in the brick the shapes are more regular and strokes more exact.

The strokes shown in No. 13 are of a free nature, growing from a common center and varying in length. These are used in the massing of foliage and in large flat surfaces when the direction of stroke changes the monotony of the large area.

In making a large mass of any value or values, it is always best to allow some of the strokes to run together and others to separate a little so as to show a little of the white paper as 11B. This gives vibration to your mass and does not present a dead surface as illustrated in 11A.

In sketching in pencil one must keep in mind two important things; namely, that the direction of the pencil strokes must emphasize and express the direction of planes, and second, that the strokes and masses must represent the texture of the subject sketched. Fig. 1, Plate B, shows rendering of vertical and horizontal boarding, the strokes emphasizing the direction of the boards. The same rule holds in the rendering of the simple foliage, Fig. 2.

These short, quick strokes, as contrasted with the long strokes in the boarding, change in direction as the direction of the foliage changes. These two types of strokes are combined in a sketch giving combinations of both strokes.

Plate C illustrates the method of procedure in sketching a window. First the drawing of the leading lines of your sketch, to assist you in laying the masses. Second the drawing of the lighter value, touching in a small area of dark to get the contrasting value relations: and third the lights and darks with accents. Note the amount of white paper that is allowed to show thru which adds sparkle to the contrasting values. Also note the sharp accents with the 2B pencil in the window and under the shadow side of the bricks. This gives added contrast and vigor to the simple sketch.

The full page drawing of "The Side Door" in the Spite House, Marblehead, Massachusetts, clearly illus-

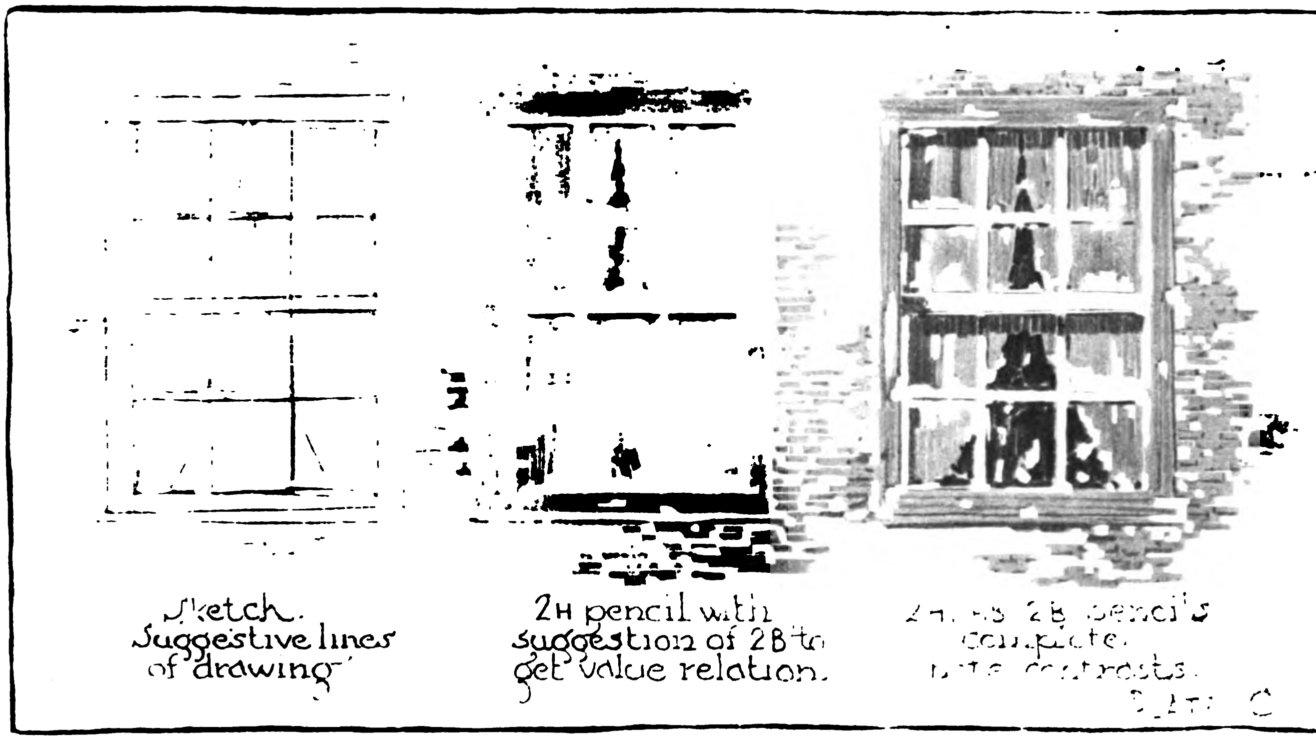

PLATE C.

trates all the strokes, the crispness of line and mass, their direction to emphasize various phases, and the contrasting values, which give brilliancy and spontaneity to the work.

THE NEED OF MORE VITAL CONTACTS BETWEEN THE SCHOOL AND INDUSTRY

DeWitt S. Morgan, Arsenal Technical Schools, Indianapolis

IT IS somewhat difficult to discuss the *need* of more vital contacts between the school and industry without a digression into a discussion of *methods* of establishing and maintaining such contacts. The necessity of contacts more vital is admitted both by schoolmen and industrial leaders with scarcely an exception. There are those who differ as to the degree to which this contactual relation may be evolved, and as to the results which the relation should obtain, but there is no denial of the proposition that a closer relationship between the school and industry will result in benefits to both institutions and to the individuals that both serve. The universal acceptance of the fact that the need exists almost precludes any necessity for a discussion. There is, however, some justification for an analysis of the conditions which make the contacts so necessary for upon our ideas of the reason for the need will be constructed the methods of establishing the contacts. Methods adopted upon the assumption of false needs will fail and will work harm; those which are based upon a true vision of conditions will eventually succeed.

1. In the first place, *the existing social and industrial order has brought about a condition which leaves the average youth wholly isolated from the world in which men do their work, and gives him no opportunity to observe the doing of such tasks as would give an incentive for achievement.* There is a great deal of discussion of the question, "Why boys leave school." We are passing thru a period when the burden of the blame rests with ill-adapted courses of study. There are those who emphasize the failure of the school to discover the peculiar aptitudes of the child and its failure to offer instruction which meets his peculiar needs. But there is a condition which prevails which seems to be more nearly the root of the trouble and which has not been so widely recognized; briefly it may be stated that, *the world of boys and the world of men are farther apart than they ever were before.* A startling change has taken place in the last generation in the opportunities which exist for occupational vision and inspiration. This is not so pronounced in rural communities, for there the contact of boys with the work of men is close and intimate. The acquaintance which a boy has with a genial farmer or successful merchant is frequently a source of much inspiration for similar achievement. This influence in developing ambitions cannot be overestimated; but in cities, which now comprehend over half of our population, boys have a very limited opportunity to become acquainted with men and their work. A talk with the average high school boy of the city reveals a

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startling aimlessness which can well be explained when one learns that he knows of nothing in the world of occupations that would cause any ambition or arouse any interest. There is plenty of stimulation for possession of wealth; there is everything to urge a boy to *have* things but very little to stimulate an interest in *doing* things. On the one end of the scale is the boy whose father is a discontented factory hand and all he hears of work is that it is something to be avoided because of its utter disagreeableness. On the other end of the scale is the boy whose father is so engrossed in big affairs that all the boy knows of the father's work is the fact of a daily trip to the office, the periodic intervals out of town, and that his father is too busy to be bothered. For both these lads the school has much to do. It should fill the void in the life of these boys which this new situation creates. It should do something which will supplant a desire to have things with a desire to do things. It should create the condition whereby the boy thru school, may get closer to what the world does. In order for the school to perform this new task effectively it is necessary for the school itself to keep very close to what the world does.

This function of the school must be performed in order that vocational guidance, vocational education and kindred programs may accomplish any worth-while ends. An intelligent incentive to do something necessarily precedes the training to do that thing. We cannot hope to teach unless there is a desire to learn. The school as a social agency is called upon in many cases to supply not only the opportunity for an education but also the motive power within the boy for getting it. Training will always involve a sacrifice of effort and of money; of present ease for future good; and where the willingness to make the sacrifice is lacking, as it so frequently is, the school must supply some powerful incentives for making the sacrifice.

This is a problem which the school cannot solve alone. It can only be worked out thru such contacts between the school and industry as will result in bringing the alluring features of skilled occupations to the schools in a very concrete way. The United States census in 1910 lists ten thousand occupations, ten thousand careers to which the school may lead in a broad way. The schools thru co-operation with Chambers of Commerce and other civic agencies, may begin to formulate material which will touch upon the range of industrial activities of a given community, and so present the material in the school that it will incite an interest in industrial accomplishments. The leaders of the industrial life of the community may be brought before the schools from time to time in an organized program for industrial presentation. The Wirt plan of a play-school-work day as tried in New York was fraught with great possibilities for occupational vision. The very fact that there is incorporated within the school such a curriculum as will present the activities of industry in laboratories, shops, office practice room, gardens, etc., will of itself be a potent factor in stimulation of interest in doing things. It will challenge each pupil to consider each line of work in the light of his own interests and aptitudes.

2. *Vital contacts are needed in order that certain influential personalities of industry may be a power in re-enforcing the good influences of the school.* The parent-teacher association functions as a well organized contact between the school and the home and in the grades it is without doubt an organization of great power. There is no question but that its influence extends well into the high school. But we well know that there comes a time in the life of a boy when the precepts of the home seem stilted and those of the school are unwelcome. It is then that the man who would hold the balance of power in the situation is the boy's boss. I refer to the man for whom he works after school on Saturdays, etc. The school should place itself in position to make use of this influence in a very effective way. It should be possible to have the current school record of every boy indicate the name of the man for whom he is working or has worked. Each employer so listed should be made thoroly acquainted with the fact that he may be called upon to take a part in that boy's training, and when the first money earned makes the sacrifice for school seem too great and the excitement of business makes school look dull, then the employer may be called upon to use his influence in getting the boy on the right track in his thinking and holding him to a program of further training and greater usefulness. This presumes a high-minded attitude on the part of an employer which may have to withstand the strain of some personal sacrifice. It is necessary, however, for the community to know that the development of a high-minded citizenship for the future is not alone the work of the school, but a joint task of home and school and church and shop, with each playing an important part in its own sphere. There is no question but that the schools in the adoption of such a program will find a ready response from the rank and file of the big-hearted men of industry.

3. *There is need for very vital contacts in order that the school may more effectively train for the demands of industry; and especially that for the pupil going from school to industry that a minimum of specialized additional training may be necessary in order to make him competent in a specialized task.* (I refer now, of course, to the relation of the all-day school to industry and not to part-time, continuation, and evening schools whose very existence is predicated on vital contacts.) It is here necessary for very close relationships to exist in order that the school, as well as industry, may each know its own particular sphere in training for the tasks and responsibilities of industry. It is possible that industry may be unreasonable in its expectations of what the school is able to do in training workers; and on the other

hand, it is possible that the school may try to do some things which for the interest of the pupil and of industry would be better unattempted. Employers and employees are unquestionably the best judges of the kind of industrial education needed and what part of the boy's training for industry may best be given in school and what part may best be given in the shop. Surely the school in the adoption of a program of industrial instruction should establish facilities for counseling with these groups and shaping courses of study in the light of the needs which their experience discloses. The Technical High School of Indianapolis, in planning the equipment of its laboratories, is just now securing from the plants of the city a statement of the scope of the chemical processes carried on in each, to the end that the applied work in the advanced sciences may initiate the student in the special industrial activities vital to the community.

In this conection it should be possible for industry and the schools to have a clearing house wherein the defects in school training may be centered and get first-hand to the officials who are empowered to adopt a remedy. As matters now stand, the chief agency for airing these weaknesses thruout the country is the public press. The schools have undoubtedly profited from the criticisms from this source. But the lambasting which the schools receive through such agencies reacts very severely upon the morale of the student body and of their confidence in the schools as an agency for effective training. There are frequent aspersions to the failure of the schools, but all too often they are so indefinite as to make it impossible to set about to adopt remedies. In this matter the schools should aid industry in framing its criticisms so that corrective measures may be adopted. The following letter from the chief engineer of a manufacturing plant of an Indiana city to the local vocational director indicates how constructive and valuable a frank expression to the proper authority might be. In commenting on the troubles of starting high school graduates in the engineering department of his plant, the writer says:

"The main trouble seems to be in a total ignorance along practical lines. They have no conception of shop methods or practices. They do not realize that a mechanical drawing is not an art study that may be read in half a dozen different ways but is a series of lines, figures, and notes which can be interpreted in just one way, no matter who reads it.

"The average high school graduate is not good in lettering, and is more or less careless in forming figures. I believe the students should be impressed with the fact that accuracy in a drawing may save thousands of dollars in the shop. I know of a case where a figure 3 carelessly made was mistaken for a 5. Some four hundred expensive parts were manufactured two inches too long. This caused the loss of a great deal of money, and still worse, a lot of valuable time.

"There are four assets a boy must have to be valuable in an engineering department, assuming he has average ability: (1) Technical Training, (2) Practical Training, (3) Accuracy, (4) Neatness. Speed, a valuable asset, is usually acquired with practice and familiarity with the work. The last three of the above points seem to be lacking in practically every high school student we have employed. This fact makes it necessary to actually put a boy thru a course of training the length of which depends on the boy.

"I believe, with most technical men of my acquaintance, that a boy should come from high school with a good foundation in mathematics, a certain familiarity with modern shop methods, and the habits of accuracy and neatness thoroly instilled."

A periodic request from the schools for written, definite criticism of this nature from the industrial concerns of the community might evolve a scheme which would establish courses of study and methods of presentation readily adjustable to the obvious needs of the industrial community.

There are some interesting aspects of the letter from which I have just quoted. Let me call your attention again to the statement which reads, "a boy should come from high school with a good foundation in mathematics, a certain familiarity with modern shop methods, and the habits of accuracy and neatness thoroly instilled." As to when a foundation *is* a foundation in mathematics needs much analysis and open-minded study. In working out that problem the practical engineers of industry can render valuable service to the schools in studying the matter carefully and making definite suggestions to the schools. The development of habits of accuracy and neatness involves the inauguration of methods that are compatible with the psychology of a high school boy. But the question of giving them "a certain familiarity with modern shop methods" involves either a scheme of part-time education or the establishment of a practical shop atmosphere within the school itself. The Technical High School, Indianapolis, is at the present time evolving plans which are designed to meet this situation in certain industrial courses. The plans of the new plant call for one classroom adjacent to the central office for the use of advanced classes in commercial production. These classes are to be made up of picked students from the courses in commerce and to be organized as a relay service to do for the office and all departments of the school those types of commercial work which are ordinarily required in a large plant. From this class will be formed the eligibility list for special recommendation to business firms as the opportunities of the business world come to the school from time to time. The school lunchroom makes it possible to give practical training in every phase of home economics. The classes in cooking will furnish from time to time the actual product sold over the counter, as the preparation of various foods falls within the range of a logical

course of study, i. e., at one time the class will prepare the breads, at another the meats, at another the salads. The utilization of left-overs is a problem which the classes will solve in their turn and each class must work this material over into a marketable product. Herein is an attempt to acquaint pupils with actual shop methods and practices. There are many complications that will arise in attempts to practicalize all courses, but such attempts, wherever circumstances permit, will turn out a school product which will more nearly meet the expectations of industry.

4. *There is need of vital contacts that the schools may render certain peculiar services to industry which cannot be rendered without such contacts.* Lack of contacts with the farms and farmers has robbed agriculture of valuable services which agricultural colleges might have given them long ago. A plan has just been evolved whereby the Federal Bureau of Mines, thru the universities and other state agencies, plans to render practical co-operative assistance to mining industries in solving technical problems for the treatment of ores. The United Typothetae School of Printing of Indianapolis is now acting as a counselor to employers and employees in determining the content of courses offered to apprentices in printing. Industrial plants are now studying the problem of employment as never before. Personnel departments have been established and industry recognizes the need of certain agencies which are primarily educational in their nature. In this work the schools may work with industry much to their mutual advantage. The school record might well supplement the employment record of the shop, in order that employment problems of industry might be simplified and made more effective. Let us hope that a failure to establish contacts will not rob society of the benefits which will arise from the service that students and the school can render to social welfare in this new field of scientific study.

5. There is but one other phase of the needs for contact that I would bring to your consideration. *It is necessary for a very close relationship to be established between the school and the shop in order that each may assume its proper function in civic development.* I have touched upon this above, but in a somewhat different aspect. Our new industrial order has brought us face to face with the fact that industrial plants must assume certain educational functions within themselves for proper training in their specialized tasks. As these functions develop this phase of educational activity will assume increasing importance and influence in shaping certain ideals of our citizenship. If industry will assume responsibility for educational work within itself it must also, for the public good, assume a responsibility for directing that education in a spirit that is true to national ideals. In the fulfillment of this, industry and the school should keep very close together. We shall appreciate more and more as time goes on that the American school and the American shop are agencies fostering the ideals which will make America what she will be. In this work, the school and the shop should be found working very close together with a perfect understanding.

Graphic Aids in Vocational Teaching Analysis

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(Conclusion)

JOB or topic analysis is closely and intimately linked with the *lesson plan* for teaching. The unit analysis is closely linked with the *unit plan* for selecting and organizing unit courses. The sample lists of headings which follow are for recording job and trade analysis. Similar or parallel study is carried out and recorded in topic and subject analysis. They are for recording data accumulated in the analysis. The first set is for use in connection with trade analysis and the second in connection with *instructive* recording as job analysis is carried forward. The breadth of perspective and thinking involved in job analysis is within the grasp of the individual beginning work in analysis and at the same time it is virtually a cross section of the total to finally come in the analysis of the total trade. After some work in Sheet No. 2 of the series for recording the trade analysis results, the teacher or student teacher analyzing carries the job analysis series thru to completion for several jobs before going to Sheet No. 3. In each job analysis he carries it to and thru a lesson plan before starting on the analyzing of another job.

Headings for data sheets for *recording the analysis of the total in the given trade.* (See The Instructor, the Man, and the Job, by Allen, to be used as reference text.)

Sheet No. 1. On a number of slips of paper put the name of a job which you regard as typical of the work of the various branches of this trade. Classify these any way you desire on this sheet.

Sheet No. 2. Chart the occupational divisions of the trade. Indicate:

a. Major divisions.
b. Sub-divisions.
c. Divisions by units.
d. Divisions by jobs within units.
e. Divisions by parts within jobs.

Note:—Job Analysis data sheets are worked through for several jobs at this point before going forward to Sheet No. 3. (See "Data Sheet for Recording Job Analysis").

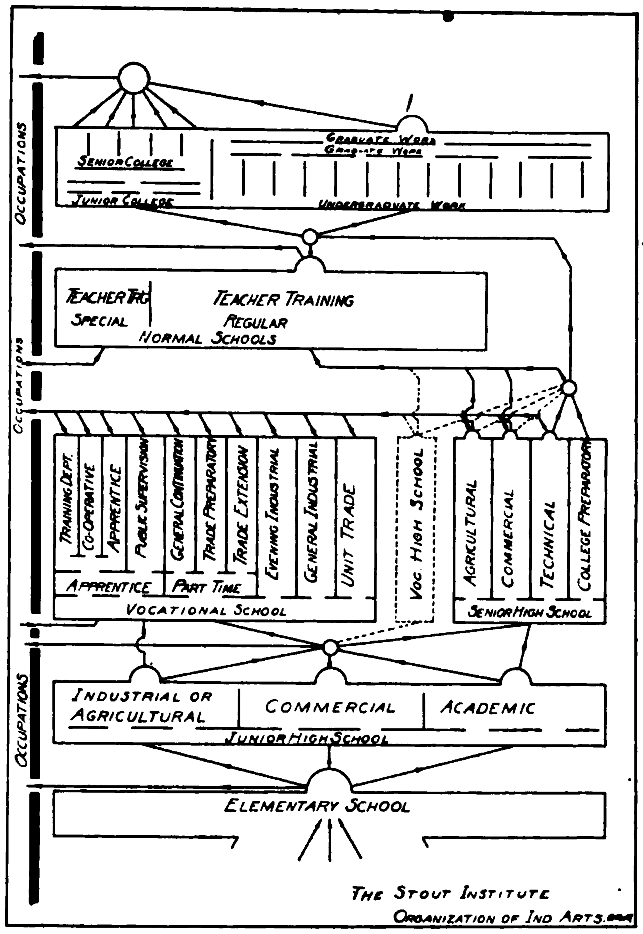


FIG. 8.

Sheet No. 3. Arrange the *units* in *instructional order.* Specify checking levels.

Sheet No. 4. Arrange the *jobs* within the units in *instructional order.* Specify checking levels.

Sheet No. 5. Arrange the steps within three typical jobs of the first unit (a simple job, a medium job, and a difficult job). *First,* put them in *production order; second,* put them in *instructional order.*

Sheet No. 6. Classify by *units* and *list by units* the following which must be known for each unit:

Technical knowledge—
- Drawing.
- Mathematics.
- Trade Judgment.

Science.
Trade Materials.
Dangers (Safety First).
Care of Tools and Equipment.
Trade Terms.

Sheet No. 7. Classify the material called for on Sheet No. 6 *by jobs within units.*

Headings for Data Sheets in the Analysis of a Typical Job in a Given Trade.

Sheet No. 1. Take a simple job in your trade such as a beginner or apprentice would have to do and describe in detail the operations necessary to do this job. Put them in their *production order,* omitting such items as getting tools, stock, drawings, etc.

Sheet No. 2. Continue with the analysis, taking the operations listed, and divide each into the *manual or doing* side and the *mental* or thought side.

It will be kept in mind that the *manual or doing* side will have listed only those steps which are *done.* The mental or thinking column *may* have in it a number of things. There may be some things from the field of technical knowledge (technical knowledge sub-divides into drawing, mathematics, and trade judgment); from science, from knowledge of trade materials, from knowledge of dangers (safety first) from information on the care and use of tools and equipment, or from knowledge of trade terms. This sheet will be a complete analysis of what *must* be *known* and *done* to do the job. *The sheets which follow call for selections from the things listed in the mental or thinking column.*

Job.....................

Manual or Doing	Mental or Thinking

Sheet No. 3. Continuing with the analysis select from the mental or thinking column on Sheet No. 2 those things which you believe come under the heading of *technical.* These will list under one of the following headings:

Drawing	Mathematics	Trade Judgment

Sheet No. 4. Continuing with the analysis classify the drawing:

Kind? (freehand or (mechanical)	Reads or Makes?	Is it for: Finding dimensions? Learning shapes? Assembling? Getting out Stock?

Sheet No. 5. Continuing with the analysis, classify the mathematics:

Special methods, devices, etc.	Accuracy required.

Sheet No. 6. In some technical work where the skill may be practically nothing the man is paid for knowing how to do the right thing at the right time. He is practically paid for his *trade judgment.* In some trades this is more frequent than others. Continuing the analysis, indicate the trade judgment required, if any, in the job on which you are working out the analysis.

Sheet No. 7. There are a number of facts in *science* which all are agreed are *nice* for men to know in their trade. Continuing with the analysis, list on this sheet those things in the mental or thinking column on sheet No. 2 which come under the heading of science which *must* be known to do the job.

Sheet No. 8. Continuing the analysis, select those items from the mental or thinking column on sheet No. 2 which call for a *knowledge of trade materials.* Separate these as follows:

Sheet No. 9. List the *dangers* in connection with doing the job which are noted in the mental or thinking column of sheet No. 2 and which must be known by a person doing the job. Put them where they belong below.

	Occupational	Accidental	Carelessness	Ignorance	Cause
To Self					
To Others					

Sheet No. 10. List those things in the mental or thinking side of sheet No. 2 which an individual doing the job should know about the *care and use of tools and equipment.* Put them where they belong under the headings on this sheet.

Care while using—prevention of abuse.
Care while not in use—protection.
Care to prevent loss—how to know where tools are and where to put them.
Waste.

Sheet No. 11. List the trade terms called for in the mental or thinking side of sheet No. 2 which must be known. Put them in the proper column.

Material	**Sym.**	**Location**	**Sym.**
Operation	**Sym.**	**Special**	**Sym.**

Keeping in mind that this analysis is for the vocational teacher's continuous use in planning and carrying on trade teaching, the vocational teacher in training meets the lesson plan (Harvey Plan) in the first job analyzed. When the first set of job-analysis-data sheets is worked out study is made of the teaching of the job. When deemed expedient the teacher in training does just a little practice teaching at this time. For those who later must swim, and who are inclined to under-rate present instruction in swimming, an initial experience in the water insures close attention to instruction. Thru developmental lessons the divisions of the lesson plan are understood as follows:

1. Purpose.
2. What must be known and done to accomplish
3. What pupils already know and can do.

this purpose.

4. What remains to be taught.
5. Teaching.
   a. Purpose.
   b. Preparation.
   c. Presentation.
   d. Application or testing.
   e. Drill.

Scrutiny is made of the data listed in the job analysis sheets. It is seen that this is the material for the first two steps in the lesson plan for teaching the job and, when arranged based on a study of the pupils, the first four. The fifth is studied. Each time a job is analyzed the status of the resulting material as lesson plan data is worked through.

As progress is made on sheets No. 5 and No. 6 of the Trade Analysis series, unit plans for teaching units are worked thru. These call for completion *for the unit* of the first two, later four, headings worked out in a lesson plan. The studies in psychology, teaching vocational subjects, etc., are worked thru as they become necessary in solving the proposition of how to teach the *jobs* analyzed. The organization of related material is studied and worked thru as a natural following up of analysis of units. In other words, his major study is the analysis of the trade, and the analysis of how to teach the trade. These are very closely allied as is indicated in relation between the job analysis material and the contents of the lesson plan. The studies in related subjects, psychology, pedagogy, etc., taught as they are needed, aid in the application and completion of the major study.

As the analysis for teaching progresses study is taken up of the business of the vocational school. Its relationships with other existing schools are analyzed and its direct contact with industry worked out in study of the various kinds of vocational classes and classifications of pupils. Fig. 8 is used in focusing the study of schools. Fig. 9 is used in connection with the working out of the various lines of industrial contact thru vocational schools with industry.

In Fig. 8 the educational agencies thru which industrial and vocational work is operating are represented with some of the possible business relationships between the agencies. Emphasis is placed on trade and industrial in the vocational school area, it being understood that vocational work in agriculture, home economics, and commercial work would be included in a chart of total fields. As indicated in Fig. 8, educational organization tends now to limit the elementary school to six years. This school takes all pupils, usually under compulsory education laws, and puts them in possession of those fundamentals which are the minimum for citizenship participation. Such industrial work as is carried on in this school is to make the prospective citizens better consumers.

Educational opportunity lines from the elementary school lead to the junior high school. Some leave for the occupations. The junior high school, taking the pupils in the seventh, eighth and ninth years of school at approximately the ages of 12, 13, and 14, provides in its industrial work as well as in the other lines, for classification of the pupils. Various administrative means have been used, as indicated at the lower part of the junior high school territory, to provide an initial period for orientation, in the school. Following this period of orientation, based on impressions received by the pupil, decision by the parents, and guidance by the teacher, the pupils are classified into one of the three divisions as indicated.

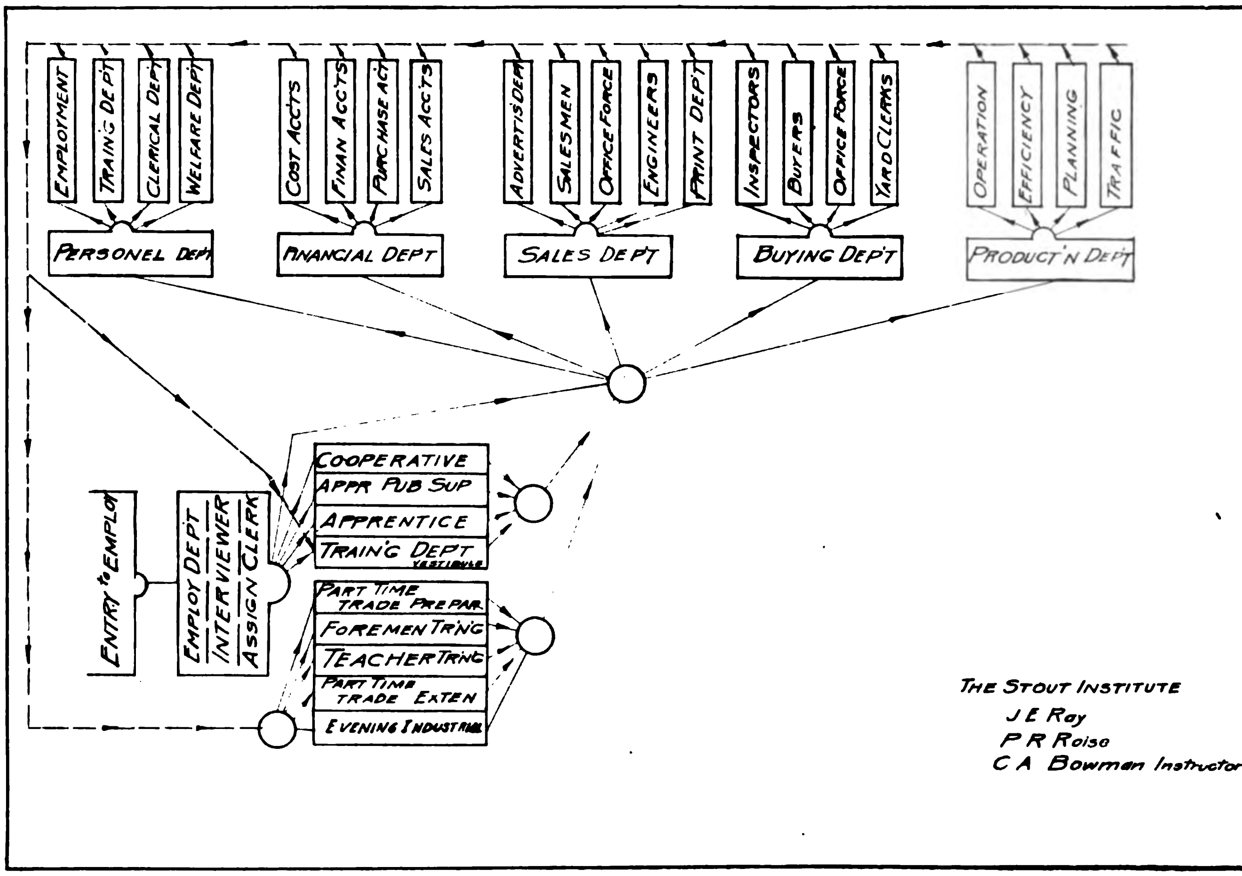


FIG. 9.

Recognition of material
Knowledge of characteristics

From the junior high school in which various try-out studies have been made with resulting classifications of and by the pupils, educational opportunity is open in several directions. Also some go to the occupations. As indicated on the chart there is a direct line from the academic work of the junior high school to the senior high school. There is also a direct line from the industrial work in the Junior High School to the vocational school. There are also possible cross lines from the junior high school as indicated. Usually, however, where a student follows a line other than the direct, assuming that the direct line from the commercial is into the occupations, he will probably lose a little time in making up work not taken in his junior high school course. That is, the industrial group enter to advantage in the vocational school, the academic to advantage in the senior high school, and the commercial enter to advantage in the occupations or the commercial work in the senior high school.

If we think of the elementary school as a level of preparation, the junior high school of classification, the senior high—vocational high—vocational school level becomes one of preparation again. Including the teacher training in the level of preparation we find the junior college growing up as the classification level feeding the senior college with classified students as the junior high school feeds the next level with classified students. It is probable that the vocational high school should shortly be indicated by solid lines as soon as it goes thru the period of initial organization.

Following this survey (Fig. 8) the student teachers carry thru an intensive scrutiny of the industrial environment of the vocational pupils. The purpose of this study (Fig. 9) is to aid in securing close relationships between vocational schools, especially in part-time and evening work, and the industries. Fig. 9 is an assignment chart which is used in working out the classifications of pressure which cause the content of work in vocational classes.

If we consider the individual as passing thru the indicated entry to employment, he goes thru the employment department meeting an interviewer, then to an appointment clerk, and then after classification goes into the plant. There are several possible lines along which this classification may send him. He may, as indicated, go directly into one of the major divisions of the establishment. As indicated the usual one is the direct line into production. If he possesses certain qualifications he may, if there is need for workers, go into one of the other major divisions. The second possible line he may follow is into cooperative training. In this he spends a certain time a week, a month, or perhaps several months, in the plant and then exchanges places with his partner and spends a like period in school. The third possible line of travel is into apprenticeship under public supervision. If he follows this he signs an indenture which puts him in the apprenticeship training in the industrial establishment and under the supervision of the state. The fourth line open is apprenticeship with-

out public supervision. The fifth is the training department.

In the growth of the training department a threefold classification of training is developing. The major portion of the training department work is given to the training of operators. A very much smaller portion of workers are given training somewhat above the level of the operator. A third, and decidedly smaller, group is given apprenticeship training equivalent. These latter are trained in the proportion that the plant needs versatile workers in skilled trades.

Across the top of Fig. 9 are indicated those lines which are open for a worker in employment to secure further vocational training while earning. This vocational training while earning is largely carried on in vocational classes under public supervision. As indicated, however, there is one line which leads from employment back to the training department of the industrial establishment and then to full employment again. This opening is offered in certain large establishments and enables their workers who desire to better themselves to secure further training at a somewhat reduced wage.

In the vocational training available under Smith-Hughes authorization and State authorization, we have the part-time trade preparatory, part-time trade extension, the evening industrial, and the foreman training. The teacher training work is vocational. The general continuation work being what it is classifies outside of the individual's direct vocational improvement. The vocational teacher in training accordingly studies the legal enrollment of each of these kinds of vocational classes and charts in the space at the right the typical teaching content and enrollment make-up of each of these classes. This necessitates a study of federal and state laws, and of typical industrial organization. These studies give definite location for the use of the results of the trade-analysis work. The chief use of trade-analysis results in aid and guidance in teaching less than the total trade or subject as demanded in particular classes and groups of individuals. This last study of lines of industrial contact by vocational schools gives the basic means for a selection of content for vocational training.

With the *analysis* carried thru on the lines as indicated in the foregoing, the *selection* and *teaching* is carried thru and perfected thru adaptation of Kilpatrick's four rating elements: *significance of moment* of possible things for teaching with balance in favor of certain ones; greater *frequency* in probable use by group under instruction of certain things available, for teaching; *economy* in teacher time, pupil time, community finance, etc.; *availability* of certain things possible for teaching, some being better secured in school than out and some being better secured out of school than in. The application is carried forward in practice teaching. The result in the teacher is of profit to the teacher, the pupils, the school as a unit, and the community.

THE CLASS PROJECT IN DESIGN—II

Edward J. Lake, Professor of Art and Design, University of Illinois

THE unsymmetrical letters B, C, D, E, F, G, J, K, L, N, P, R, S, Z, designed as initials by the application of some decorative forms to the letter, furnish projects that require careful balance. These letters seem to face to the right or to the left, according to their form. C, E, F, G, K, L, S face to the right. B, D, J, P, R, Z face to the left.

If these letters are placed within an enclosure, as a rectangle, triangle, circle, oval, or diamond, they may be balanced by allowing a little more space within the enclosure on the side toward which the letters face. Such pronouncement of the letter, with careful regulation of proportion, may result in a very satisfactory initial. Mounting letters cut from paper on geometrical shapes of contrasted tone or color is an excellent exercise in the study of balance and proportion. This simple exercise also brings into consideration the harmony and contrast between the letter and the enclosure. It may be discovered that a letter does not look best on a mount that conforms most closely to the form of the letter. A well-balanced letter, within an enclosure of contrasting form, is more interesting and less conventional than when the letter and enclosure are alike in shape. Harmony overdone may become formal, orderly, and uninteresting. These are important observations for the class in design, and they may be made effective by experiment on a class project.

When some decorative material is employed in conjunction with a letter, the problem becomes much more complex and the possibilities much greater. A point with regard to balance may be noted from the examples given. The letter is balanced in each case by opposition of the decorative material to the action of the letter. In those letters that face to the left, as P, B, D, R, the action of the ornament is dominately to the right. In those letters that face to the right, as E, F, K, L, C, S, the action of the ornament is dominately to the left. By this opposition of the ornament the letter is in each case not only balanced, but supplemented and made complete.

The opposition of the ornament to the action of the letter must not be too evident, however. Evident support on the part of ornament is not pleasing. A thing held together or supported by ornament would be evidently weak.

It may be noted that the ornament conforms to the letters in part and opposes the letters in part. This is

THE DEVELOPMENT OF UNSYMMETRICAL LETTERS AS A CLASS PROJECT.

the double service of all well applied ornamentation. It emphasizes construction, and at the same time conforms harmoniously to that which it decorates. The importance of this idea is evident in natural beauty. The plant is made beautiful by leaves and flowers that conform to and support the structure with added interest. Also, when the snow or frost gathers on the naked trees in the winter and marks out with delicate contrast each branch and twig, we are delighted with the emphasis and variety of form which is evident. The markings of animals and birds conform with and supplement the anatomical structure.

As for the kind of ornament used in the decoration of initial letters, it is evident that the ornament need not look like some natural thing to be effective. There is interesting suggestion of a pine cone in Fig. III; flowers and vines in Numbers I, V, VI, VII, X, XI, XIII, XV; sprays of leaves in Numbers VIII, IX; and conventional lines, shapes, and spots in Numbers II, IV, XII, XIV, and XVI.

Who would choose as most effective the design of a letter that represents a natural thing most nearly like nature? The problem in design is not solved by imitating nature. Nature is a wonderful source of suggestion, and the designer of natural effects must represent natural forms accurately; but the decorator of a letter must not set up a rival interest by representing in a natural way the minute character of some natural form.

Number XIV is evidently Gothic in form; Number XIII is Renaissance in treatment, yet neither of these depend on historical ornament for effect. They are successful or not in the application of the ornament to the letter by conformity and opposition.

The final success of a design is measured by the reaction it gives to the one who observes it. It is probable that some who look at the sixteen letters shown will fail to see one that is decidedly pleasing. The members of a class would certainly not agree in their choice of the most effective letter. Even the teacher's choice should not be imposed with too much emphasis and certainly not without reason.

The problem in design is never solved conclusively. Our development in matters of design and appreciation is slow and perhaps inconclusive, yet develop we must, and the teaching of design is the process of leading to thoughtful consideration of propriety and beauty. A difficult and important task.

FIRELESS COOKERS

L. H. Baxter, St. Johnsbury, Vt.

FIRELESS cookers are by no means a new proposition, but rather an adaptation of an old principle to modern use.

Hot bodies protected by an insulating material retain their heat for a considerable length of time. It is rather a common thing in camp to dig a hole in the earth and place several hot stones within, and on top of this place a pot of beans, covering the whole with hot ashes and earth, and never were beans baked so deliciously as those baked in this manner.

The renowned New England clambake employs the same idea wherein damp seaweed is thickly spread over the embers and clams, preventing the escape of heat during cooking.

The advantages of fireless cookery are many. There is a vast saving of fuel, especially where gas, kerosene or electricity is used. In summer, when a continued fire in the kitchen makes it very unpleasant for the housewife to work, the range fire may be allowed to go out, and the cool, clean fireless cooker does the work far more thoroly than the hot oven.

The dinner may be started in the cool of the morning and then placed directly into the fireless cooker, and left with safety from fire or burning, and the meal will be ready when wanted without further tending.

Cheaper cuts of meat may be utilized by using the cooker for, altho not as fine in texture or flavor, are as fully nutritious, pound for pound, as the more expensive cuts.

Long cooking in a low temperature, such as the fireless cooker offers, improves both texture and flavor of the cheaper cuts of meat.

In experimenting with some of the cookers made by eighth-grade boys, it was found that they fully equaled in result the commercial cooker costing from 25 to 30 dollars, while they cost the boys something like five dollars.

Oatmeal put into these cookers at 8 o'clock at night, hot from the stove, taken out the next morning, twelve

TYPICAL FIRELESS COOKERS MADE BY THE AUTHOR'S STUDENTS.

hours later steaming, so that it was too warm to eat, proved conclusively that there was no witchcraft in making a fireless cooker, but well within the capabilities of an industrious lad.

The outer part of a fireless cooker is a box large enough to contain the insulating material, a kettle for holding the food, preferably a double boiler, a container for the kettle, and a hot plate.

The accompanying drawing shows a box the proper size for a one-hole fireless cooker.

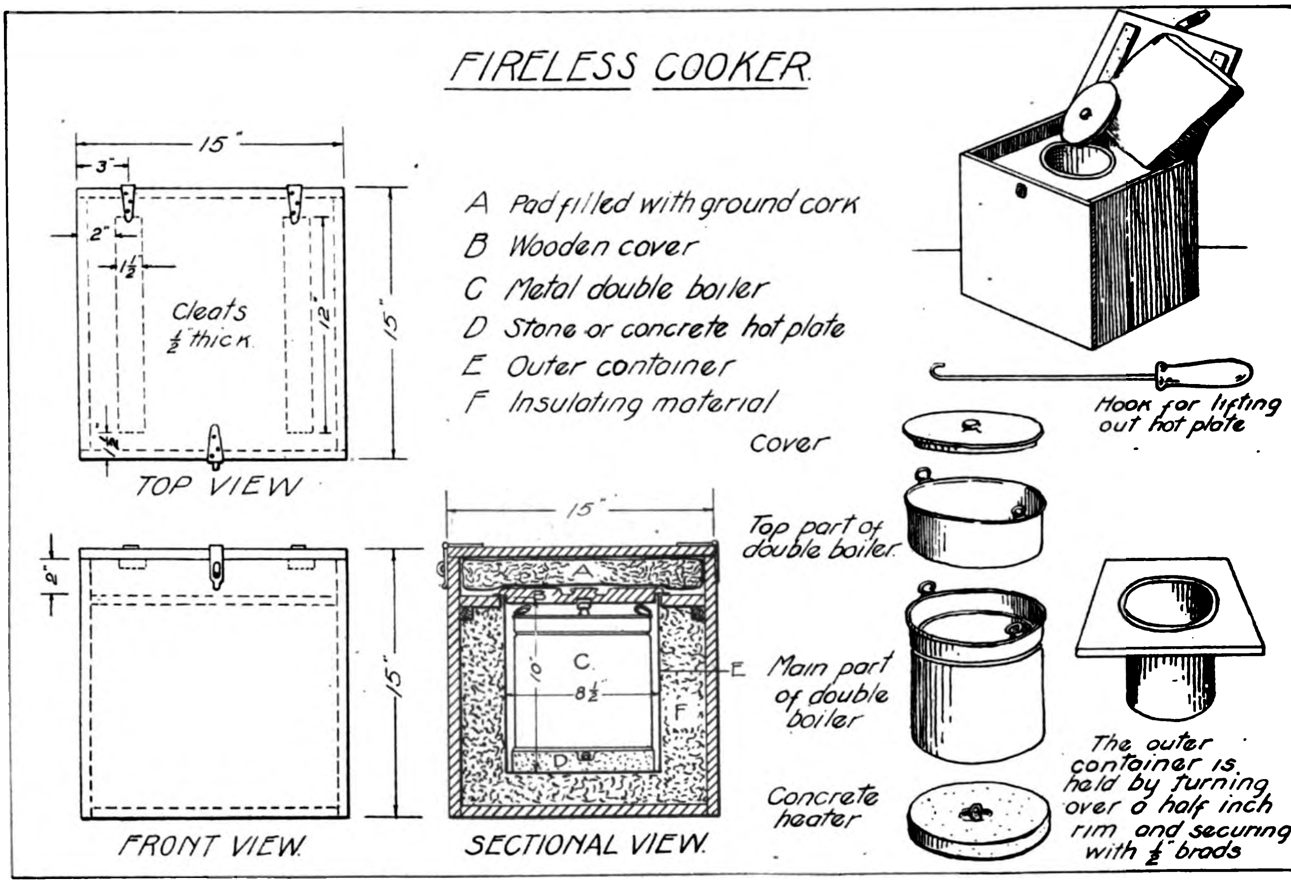
Spruce, a half inch in thickness, is a good wood to use. It will be necessary to join two or more boards to make the required thickness and this should be done by making tongued and grooved joints. One-quarter inch dowels and hot glue may be resorted to.

The ends should be ½"x14"x15", and the front and rear ½"x15"x15". These pieces should be assembled by nailing the front and rear to the two ends. Hot glue may be used in assembling.

The bottom pieces will be ½"x14"x14" inserted and nailed in a similar manner.

The cover is ½"x15"x15" and attached by means of two 3" strap hinges. The cover is also reinforced by two cleats ½"x12" screwed to the underside, 2" from the edge.

A shelf to hold the outer container is next made ½"x14"x14" and secured below the top edge, resting



DETAILS OF A FIRELESS COOKER.

on supports 5/8"x5/8"x14", which are screwed to the sides by 1" flat-head screws. This shelf has a hole cut in its center just large enough for the outer container to slip into. This outer container is 8½" in diameter by 10" deep with a ½" rim, turned over on its upper edge and held by ½" brads to top of shelf.

If a sheet metal outfit forms a part of the manual training equipment, all metal work can easily be made by the boy, otherwise a local tinsmith will have to be requisitioned.

Sometimes all the containers can be obtained in a hardware store, saving time and trouble in making them.

After the outer container is securely in place, the cooker should be turned upside down and a 3" hole cut in the bottom, as a means for filling in the insulating material.

The material should be thoroly shaken down and worked around in all corners with a stick. Recover the hole with a piece of tin tacked on.

A variety of material may be used for insulating. Crumpled paper is very satisfactory. Ground cork, hay, excelsior, Spanish moss, and wool are also quite suitable. Altho more expensive, asbestos and mineral wool are perhaps the best, having the advantage of being non-inflammable.

A cushion of a size sufficient to fill the space between the top of the container and cover should be made and filled with the same material used in the other parts of the cooker.

A cover, either metal or wood, turned out on the lathe, must fit over the outer container as shown in the sectional view, with a ring or some other means of lifting it, as shown at B.

The inner container, or the one which contains the food, is made in two parts, similar to any double boiler, as shown in sketch.

The upper part of the inner container is held from slipping into the lower part of the boiler by a groove crimped into the side of the main part of double boiler, as shown.

The hot plate can easily be cast in concrete, using a pie plate of suitable size for the form and inserting a good-sized staple for lifting.

The lifting hook is made from a piece of telephone wire inserted in a handle.

The hinge hasp holding the cover down may be secured by a halter snap.

The double hole cooker shown in the photograph is made on the same principle with a little different method in the outer box construction. The round cooker was made from a candy pail on the same principle.

America Must Have More Watchmakers, Jewelers and Engravers

W. Calver Moore, Editor of "The Keystone."

HOW would you like to be able to take your pick of four thousand five hundred positions? To know that you could go to any part of the country and make a salary of $2,600 per annum? To obtain employment in pleasant surroundings, coming into contact with the best class of people, and having an opportunity to work into a splendid business? That is the enviable situation of the young man who learns the art of watchmaking, and almost equal opportunities also await the jewelry maker and the engraver.

The great demand for men who can make a watch keep time, mend broken jewelry, place precious stones in new and fashionable settings, or engrave a monogram on a piece of silverware, has been caused by the stupendous growth of the American love for the wares of the jeweler. There is no country in the world where the standard of living is as high as it is in the United States, for a man here thinks nothing of wearing a watch and ring worth as much as the entire earthly possessions of a European in the same relative position in life. During the last fiscal year of the Internal Revenue Department we spent over five hundred million dollars for watches, jewelry, diamonds, silverware and other articles sold by the jeweler.

The growth of the watch industry has been phenomenal. Men still living can remember when a watch salesman who said his factory could turn out seven complete watches per day had difficulty in convincing his friends that he was not exaggerating. They did not believe it was possible to *sell* so many watches. The facilities of that factory have been so greatly increased by improved machinery that it now has a capacity of more than two thousand watches per day, and there are other watch factories whose combined daily output runs up into thousands of complete pocket timepieces, without counting the ones engaged in the manufacture of clocks, ship chronometers and other time-recording devices.

Inasmuch as the accuracy of watches and clocks depends on the condition and adjustment of minute and delicate parts, the regulation and repair of these articles has become an industry of no small magnitude, but it has not been able to hold its own against the rapid automatic machinery of the watch factories.

The actual manufacture of watches has become almost wholly a factory proposition. Our watch factories employ hundreds of men who are expert assemblers and adjustors. The parts are made by machinery which is accurate to thousandths of an inch, and then collated into little boxes. A man receives a number of these boxes, each containing all but a few of the separate parts of a watch movement, which it is his duty to assemble. The movements thus produced are next passed to an adjustment and inspection department, which inserts the remaining parts and gives the final adjustment that makes them commercially accurate and therefore ready for sale.

After the thousands of watches thus manufactured find their way into the pockets of their ultimate owners, begins the trouble that has caused the present great demand for watchmakers. A watch is a delicately constituted and carefully adjusted machine that can suffer many injuries through neglect, carelessness and accident. A small particle of dust that would not embarrass a typewriter or a sewing machine will put a watch out of commission. Its parts may be broken, bent or thrown out of adjustment by the jar received when its wearer runs, stumbles, jumps off a car, drops it or lays it down roughly.

The trials and tribulations of the wrist watch are particularly heart-rending. People who wear them will persist in driving nails, banging away at demountable rims, swatting golf balls and scrubbing floors, according to the sex and condition in life, and there are also many careless little movements that may jar them disastrously. So the jeweler is besieged by an army of watch wearers seeking repairs and adjustments and this has given rise to the great demand for watchmakers to do this work in jewelry stores and the shops of the trade watch repairer.

The World War has been partly responsible for the present scarcity of watchmakers and the greatly increased demand for their services. First it took many of these men into military service, some as soldiers and others to make and repair scientific instruments. To others the change in industrial conditions brought new kinds of employment. In addition to this process of shifting men about, the war caused a tremendous demand for wrist watches, and later on, as these were laid aside with the return of peace, another and almost equally great demand for pocket timepieces.

Altogether, affairs have reached a stage where this country needs between four thousand five hundred and five thousand more watchmakers. These figures are based on the requirements of jewelry stores and do not take the factories into consideration. As far as the factories are concerned, it has been more than a year since they have been unable to keep up with the demand for good American made watches.

So acute has the repair situation become that it takes from five to eight weeks to get a watch repaired in any of the large cities. Jewelry stores in all parts of the

country have racks full of waiting repair jobs and throngs of impatient customers. There are a number of men known as trade watch repairers who operate shops for the sole purpose of handling this class of work for the jewelry trade, but even these specialists, who do not lose any time waiting on customers, as the jeweler must, are wholly unable to find men enough to take care of all the work that is sent them.

Many attempts have been made to meet the scarcity of watchmakers by training a new supply of men. Watchmaking schools have been established by jewelers' associations in various parts of the country, and there are also a number of technical schools and universities which give courses in horology, as well as jewelry repair work and engraving. The ancient apprentice system can no longer be depended on to furnish recruits. Neither is it practicable for a young man to try to learn watchmaking by taking a position to "help around" a jewelry store, as his time is taken up too much by odd jobs, and when he is not occupied with such duties he finds the watchmaker is too busy to teach him anything.

During the war the Government found itself severely handicapped by the scarcity of watchmakers and scientific instrument makers who could construct or repair range finders, listening devices for submarines and airplanes, ship chronometers and similar complicated and delicate instruments. Some of the proprietors of horological schools were induced to establish classes, literally over night, to train men for these duties and the situation was relieved somewhat by this plan. However, if we were to be drawn into a large war again the problem would be a serious one. For this reason the Federal Government has begun to take an interest in the subject and thru the Board of Vocational Education has arranged for some of the discharged service men to take up watchmaking as a profession. An investigation of conditions is also being made by Carl W. Mittman, assistant curator of the Smithsonian Institution at Washington, D. C., contemplating the establishment of a National Association of Watchmakers under the auspices of the Smithsonian Institution.

The horological schools of the country at present have a combined total capacity of only a few hundred finished watchmakers per annum. They can graduate only a little more than one man per day, and for every one of these new men graduated by the schools, the watch and clock factories can turn out several thousand new timepieces. Consequently, these schools are "fifteen years behind their orders," or, in other words, it would take them fifteen years to train as many watchmakers as are needed right now, without allowing for any increase in the number of watches and the demand for their repair and adjustment.

During a recent interview with the principal of a technical school where courses are given in watchmaking, jewelry making and engraving, he stated that his school receives an average of 108 applications from jewelers for every student it is able to graduate. He exhibited letters from the finest jewelry stores throughout the United States pleading for men and setting forth the special inducements each was anxious to offer. This visit was made by the writer in connection with a wide investigation of the subject in order to determine the exact status of present conditions and learn what opportunities this class of work offers to young men.

It may be said that this field of employment has many very attractive features, including the demand for men and surety of steady work, the wages paid, the conditions surrounding the work and the business opportunities to which it leads. Compared with many other kinds of work and even with the "learned" professions it has many advantages.

The scarcity of men and the demand for their services are national. A competent watchmaker can find immediate employment in any part of the country. If he wants to work in a jewelry store he is able to obtain a situation in almost any large town or city, in a large store or a small store, north, south, east or west, according to his taste. If he wants to work in a trade watch repair shop he will be welcomed with open arms. If he prefers to establish his own business he can do that also and requires no equipment except the tools he has acquired, at a cost of perhaps $350, while learning his profession.

Jewelers advertising for watchmakers in the classified advertising pages of the jewelry trade magazines offer to pay salaries of $50 and over per week. Some stores also pay a bonus on merchandise sold, or in addition to the salary make a further division of the income from repairs with the man who makes them. This salary of $2,600 per year is more money than most men in mechanical lines are able to earn. Some artisans receive a larger salary per week when work is to be had, but their total yearly earnings are reduced by long periods of unemployment. The watchmaker never need be "out of work."

Work in a jewelry store is both pleasant and healthful. There is no discomfort from dust, no noise from whirring machinery, no unwholesome odor, no chance of injury from bursting fly wheels, no flying particles of metal. It does not entail danger of health through such causes as the lead which induces lead diabetes in paint mill workers, or the turpentine that causes painter's colic. The watchmaker's bench is of such a height that he sits up straight while working so his lungs are not crowded. Due to the accommodative powers of the eye muscles, the eyes become accustomed to the work with small parts and there is no more eye trouble among jewelers than there is among men in other lines. In short this is a profession which is free from any "occupational disease."

Watchmaking, jewelry repairing and engraving do not call for any great physical strength, as there is no necessity of being on the feet all day, handling heavy

articles or being exposed to the weather. Thus is opened a chance to earn a good living, and attain a useful position in life, for him who has had the misfortune to lose a leg in military service or by accident, or who is otherwise incapacitated for heavy or very active work.

Employment in a jewelry store perhaps offers the best openings from the standpoint of future business opportunities, because of the class of customers who patronize it. A jeweler and his employees come into contact with people who have money and believe in spending it. Watch repairing, the resetting of jewelry and its repair, and the engraving of silverware play an important part in the jewelry business. The majority of our successful jewelers of today started in as watchmakers and engravers, gradually taking on the sale of new watches, rings, diamonds, silverware and finally becoming jewelry merchants as the demand for this class of goods grew and grew and grew. What these men have done can be done by others in the same way. The income from repair jobs provides a good living, while the merchandising part of the future store is building itself up.

The young man who decides to become a doctor, dentist or lawyer must finance himself through a four-year course at a university where tuition and living expenses are high. The average young man who attends the best class of horological school for a course in watchmaking can get thru in eighteen months; tuition rates are low and most of these schools are situated in towns where board may be secured at very reasonable rates. Jewelry repair or engraving courses require an average of six months. These are average. A student with previous mechanical experience or natural aptitude for work of the kind can get thru in less time. Instruction is so arranged as to allow for progress according to individual ability.

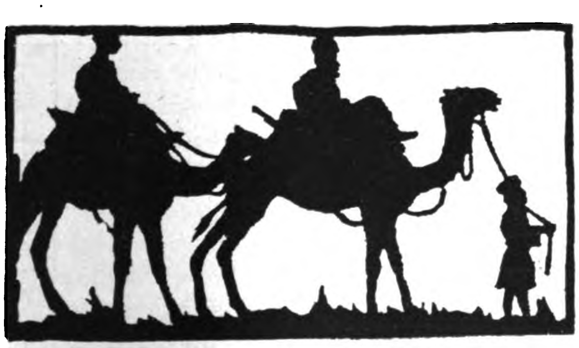
The jewelry artisan—if we may use that term to designate the graduate of any of the three courses referred to—finds work waiting for him and has the tools needed to perform it. He neither has to invest several thousands of dollars in scientific instruments and office equipment like the doctor or dentist, nor join with them and the young lawyer in years of disheartening struggle to get established. The outlook for his future is equally as good as theirs. In ten years he will be just as able to afford the services of a lawyer, doctor or dentist as any one of them will be able to buy his diamonds.

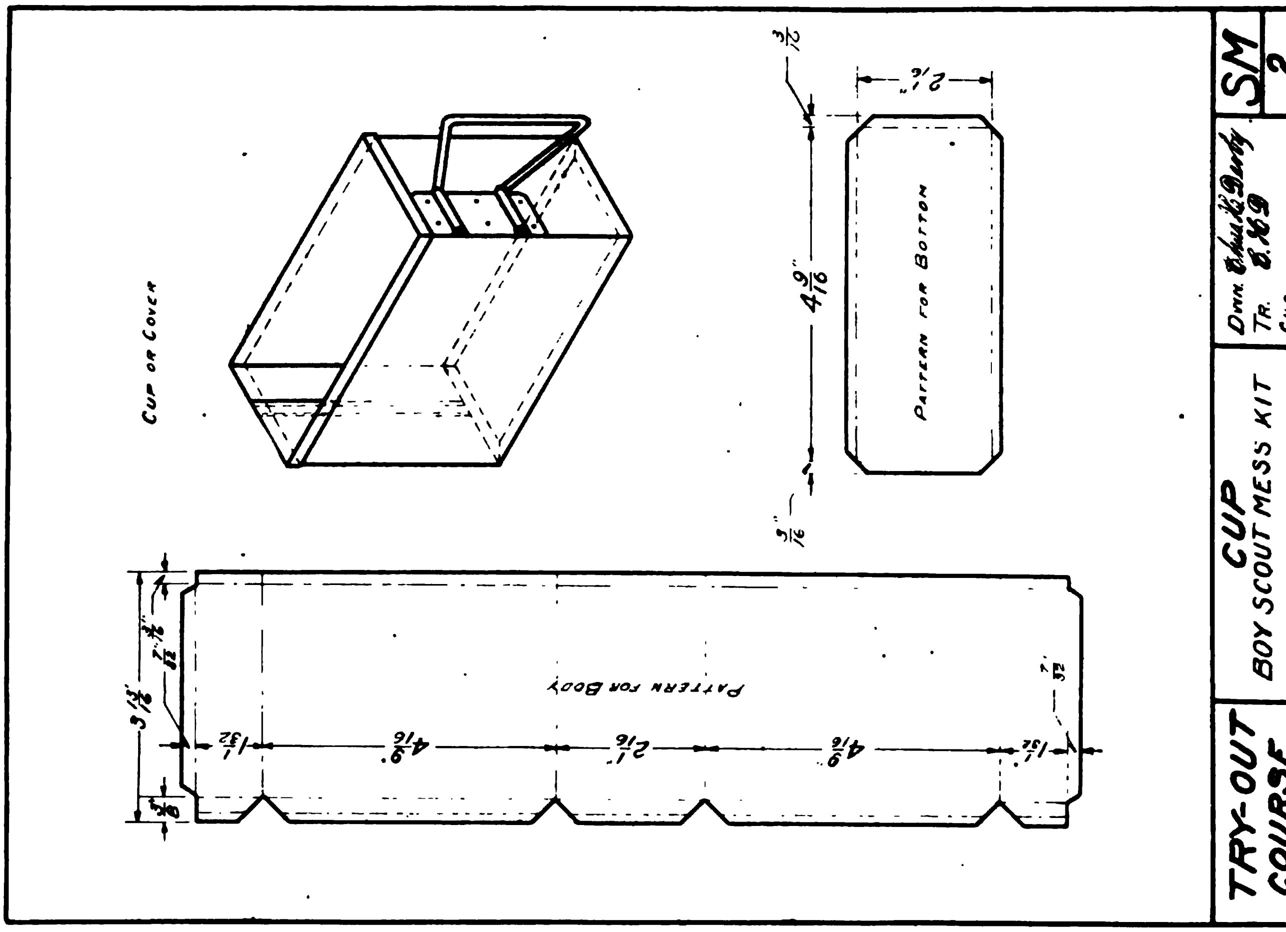
The science of horology as taught in the technical school, covers a wide range of scientific and mechanical subjects that are fascinating to the young man whose thoughts run along such lines. He learns not only to make and adjust all the parts of timekeeping mechanisms but also how to take time from the sun and stars and from wireless apparatus. Ancient means of time telling, such as the sun dial, the water clock and the sand glass are explained, and the profession has its literature, replete with the romance of Galileo's discovery of the principle of the pendulum and many other interesting incidents.

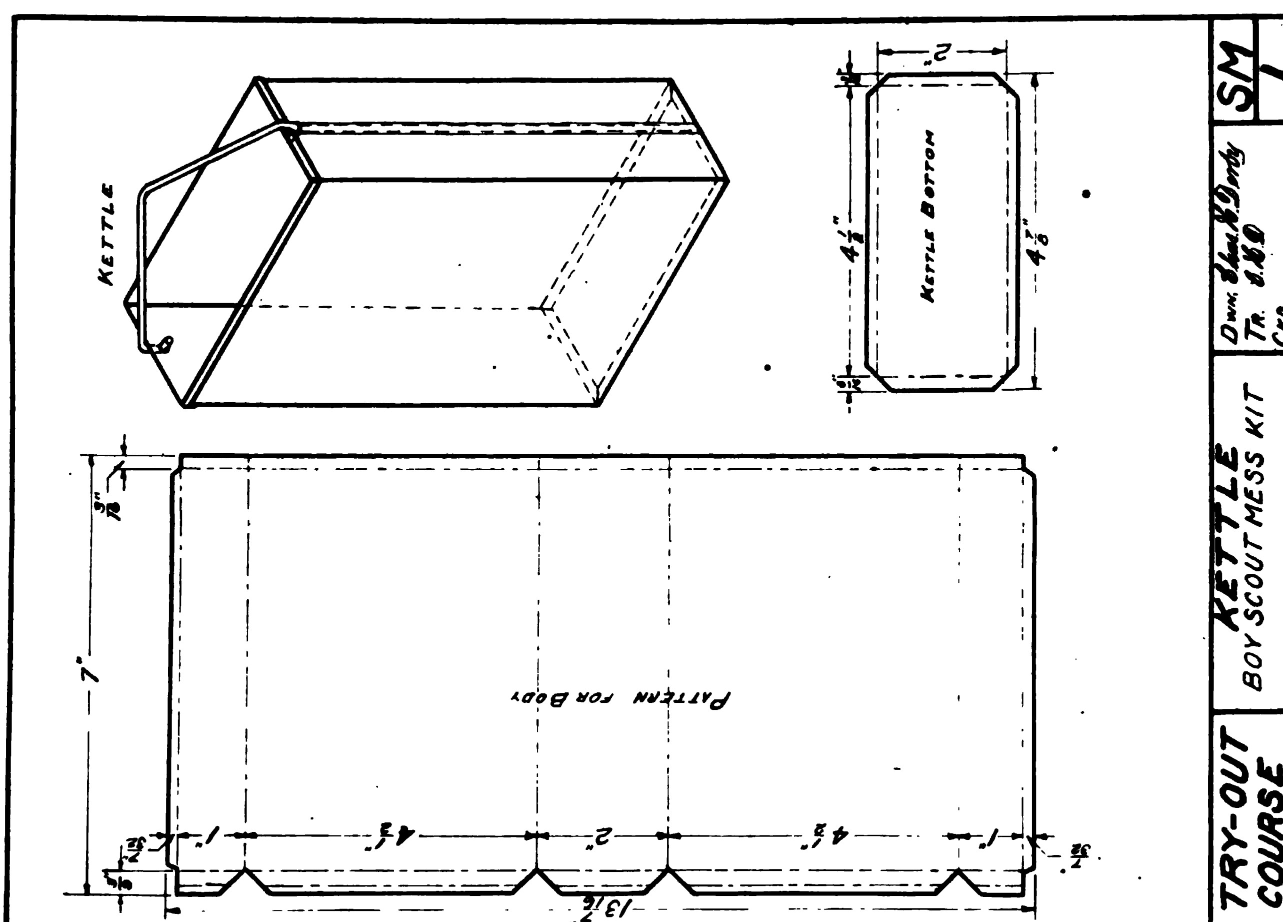
The educational equipment of the average high school student is sufficient to enable him to become a jewelry artisan, via the technical school. Thoro training of this kind means a more rapid rise to full earning capacity than attempting to learn at the bench, both because of the unsatisfactory conditions already mentioned, and because the well equipped school has better facilities and gives a more comprehensive grounding in the most advanced features than the busy jeweler can attempt to impart. There is no advantage from the standpoint of "practical work instead of theory" because the school gives both and the shop can provide only one. Students not only learn the science, but are taught to practice it, by actually performing every operation.

It will pay the young man who is undecided about his life work to give careful consideration to the profession of watchmaking, jewelry making or engraving. Graduating from high school at the age of 18, he can easily learn this profession and be making a splendid salary before he is 21.

There does not appear to be any likelihood of this field becoming overcrowded, as the schools cannot graduate ten per cent of the men required. Even if educational facilities are increased, as it is hoped they will be, the number of watches in the country is still growing by thousands per day and the advancement from watchmaker to merchant will continue to deplete the ranks of jewelry artisans and make openings in plenty for new men as fast as they can be trained. Even as this article is written, one of the big watch case companies is scouring the country in an effort to add thirty engravers to its force.




Cup or Cover
Pattern for Bottom
Pattern for Body
TRY-OUT COURSE
CUP
BOY SCOUT MESS KIT
SM
2


Kettle
Kettle Bottom
Pattern for Body
TRY-OUT COURSE
KETTLE
BOY SCOUT MESS KIT
SM
1

Junior High School Projects in Sheetmetal Work

Charles H. Derby, Instructor in Sheetmetal Work, Erie, Pa.

ONE of the most difficult problems confronting the teacher of sheetmetal work in the junior high school is to devise projects which will be interesting to the boy and at the same time include the fundamental experiences necessary in try-out courses. Many projects can be devised to give the experience in fundamental tool processes, but few can be selected that are elementary enough for the beginner.

In the search for projects of the right degree of difficulty, my attention was called to the Boy Scout mess kit. My son, a boy scout, desired to make a mess kit for his own use, and in making it suggested to me the feasibility of using it as a prevocational project.

The boy scout mess kit consists of a kettle and a cup which slide together, forming a container for the grate and the frying pan. Detachable handles are furnished for the frying pan and the cup and are carried inside the kettle. The first problem was to devise some means of making by hand those parts of the kit which in the commercial article were made by press work. An analysis of the processes required discloses that the following tools and machines were brought into use in making the kit by hand: Scratch awl, prick punch, squaring shears, hand snip, hammer, punch, rivet set, pliers, mallet, soldering copper, vise, grooving machine folder, wiring machine, wire cutters, square head stake, creasing stake, rule, file, cornice brake, and oxy-acetylene welding machine. The principles and operations involved will be explained in connection with the making of the different pieces of the kit.

In approaching the making of each separate article, the question is asked, What is the best material of which to make this? The resulting discussion brings out the names of the metals used, their properties, and their suitability for different articles. For example, we decide to make the kettle and cup of tinplate or "sheet tin." A little talk on why sheet tin is better than sheet iron, how the plate is coated with the tin, how sheet tin is marked to indicate thickness, the regular sizes in which sheet tin may be bought, impresses these facts on the mind of the boy at a time when he is interested in sheet tin. The different members of the class are assigned reports on the properties and manufacture of the different metals, to be presented at an assigned date.

Each article of the kit is treated as a separate project and is made in the following order: Kettle, cup, cup handle, frying pan, frying pan handle, and grate.

In making the kettle, each member of the class is supplied with a blueprint (Figure SM1) and a sample of the kettle is placed before the class. Their attention is called first to the pictorial representation in the upper right corner. Then different members of the class are required to point out the lines on the development that correspond to indicated lines on the perspective and on the kettle itself. This discussion brings out the reason why some lines are dotted and some are solid, teaches the boys to read blueprints, to get accurate measurements, and to observe the steps in the development of the pattern. Allowance for hem, lock seam, and double seam are pointed out, and reasons given for the amount allowed. The notches are explained, with reasons why they have to be cut as shown.

Next, two or three boys are given a pattern and a sheet of IX bright tin with the problem of how to lay the pattern on the given sheet so as to get the largest possible number of parts. They then find the number of sheets needed for the class, and report back to the class showing the best way to cut the stock so as to provide for everybody.

The use of the squaring shears is then explained. Two boys are allowed to set the gauge to the width of the pattern. Two more cut the sheets into strips and two others set the gauge to length and square one end of each strip. Then each member of the class cuts his own piece. The pattern is then placed on the piece and each boy marks his points with a scratch awl and prick punch.

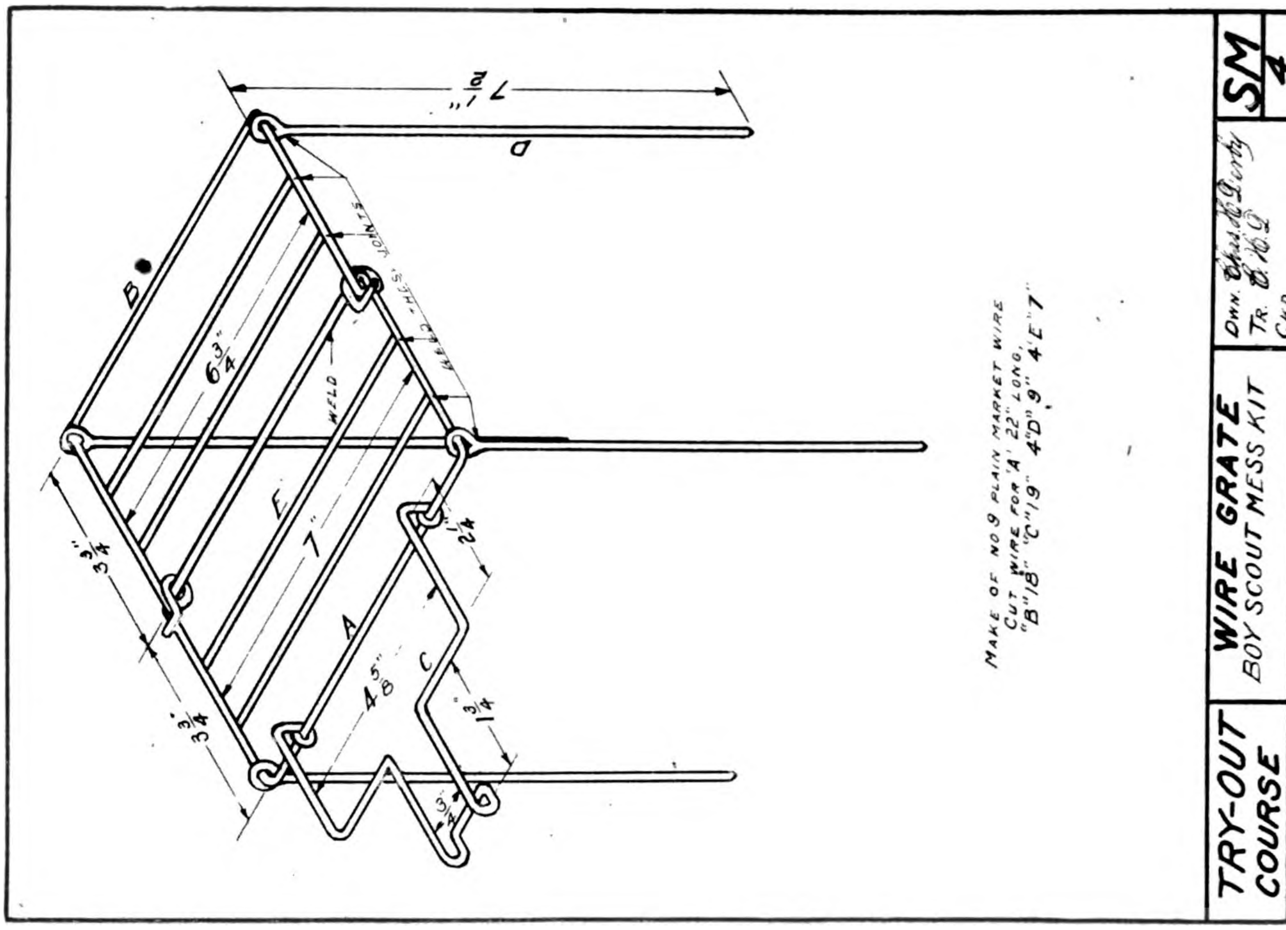
This is followed by a demonstration of the right use of the snips in cutting the notches without cutting beyond the lines. This demonstration is not complete until there is developed the idea of joining the ends with a lock seam, and grooving the seam to keep it from unlocking. Allowance of material to make the locked and grooved seam is figured.

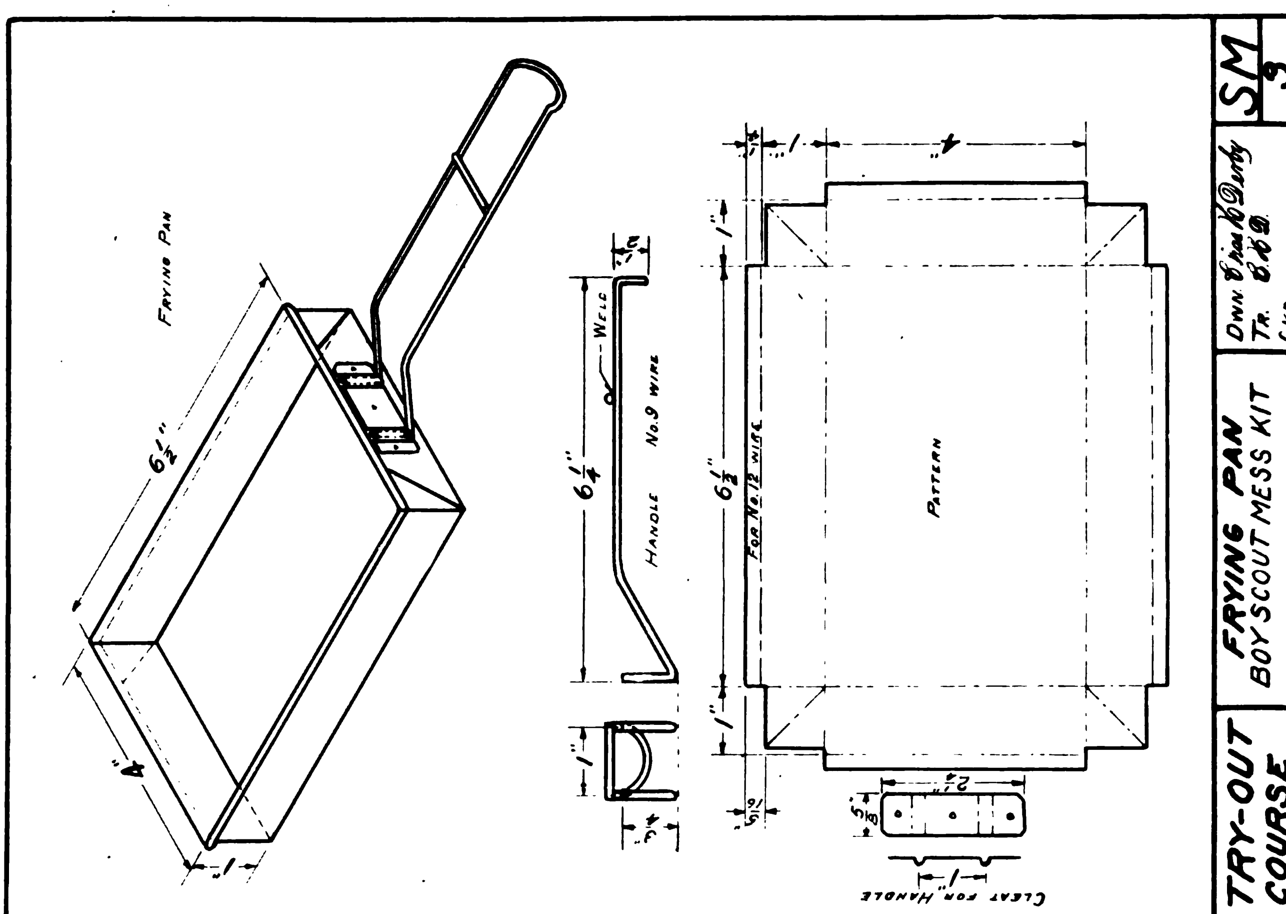
In the same manner the idea of the hem is developed and an explanation made of how to form it.

Next, the folder is explained and demonstrated. The hem is turned thru the lock for the double seam, then for the locked and grooved seam. Next, we are ready for the brake which must be set so that it will not flatten the locks. After the brake has been used, we are ready to groove and roll the seam, so the principles and adjustments of the grooving machine are demonstrated.

The bottoms are then cut in the squaring shears, locked and placed into position. The square head stake is placed in a bench plate, the locks are squeezed together and double seamed with a mallet, the corners rounded with a hammer and the first step in construction completed.

Since this is to be used as a kettle, the question naturally arises, will this hold water? A trial soon convinces the boy that something further is needed. At this point, quite a little time is spent in finding what is known about solder, how it is made, what proportions of the different metals is used in making it, and how it is applied. Questions bring out the use of copper for a


TRY-OUT COURSE
WIRE GRATE
BOY SCOUT MESS KIT
DWN.
TR.
CKD.
SM 4
MAKE OF NO 9 PLAIN MARKET WIRE
CUT WIRE FOR 'A' 22" LONG, "B" 18" "C" 19" "D" 9" "E" 7"
WELD
WELD THESE JOINTS
A
B
C
D
E


TRY-OUT COURSE
FRYING PAN
BOY SCOUT MESS KIT
DWN.
TR.
CKD.
SM 3
FRYING PAN
HANDLE No.9 WIRE
WELD
PATTERN
FOR No.12 WIRE
CLEAT FOR HANDLE

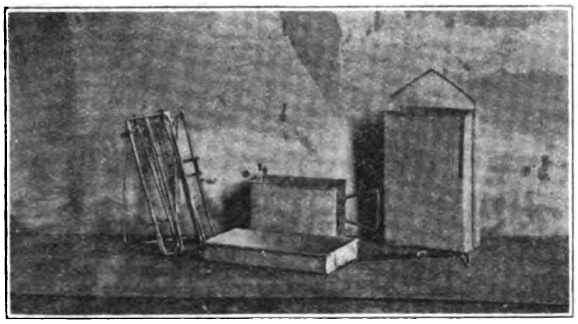


FIG. S. M. 6. THE COMPLETE KIT.

soldering "iron," how the iron is prepared for soldering, the use of flux, and the selection of the proper flux for soldering, the use of flux, and the selection of the proper flux for the metal used in the kettle.

As soldering is the most common operation in the sheetmetal trade, and as an otherwise first-class job may be spoiled by poor soldering, too much attention cannot be given to the care and handling of the soldering copper. A little practice on some scraps of metal properly seamed up, will add immensely to the boy's skill in the use of this process.

Holes are punched at the edge of the kettle, and a number 12 wire, cut 7½" in length and formed as shown in the drawing, is attached as a handle. This gives opportunity to explain the Wire-gauge and how it is used and to bring out the different kinds of wire that may be purchased for use.

In the making of the cup, substantially the same processes are followed, since the cup is essentially the same as the kettle with the exception of the handle. The handle of the cup is held in place by a clip or cleat of tin, riveted to the side of the cup as shown in Fig. SM2.

First the cleat is cut to the given dimensions. Next, creases are made to fit number 9 wire, and the clip is riveted in place on the cup. A piece of number 9 wire, 7½" long, is bent as follows: Bend ends inward to a

FIG. S. M. 7. THE KIT IN USE.

little more than right angles at 2¼" from each end, so that the free ends of the wire are about ½" apart. Then hold the last inch of the free ends firmly in the vise and bend the handle over at right angles making the form shown in Fig. SM2. It will be necessary to adjust the ends with the pliers until they exactly fit the cleat on the side of the cup.

In the making of the frying pan the square pan corner is explained and the merits of the square pan corner over the double seamed and soldered corner for

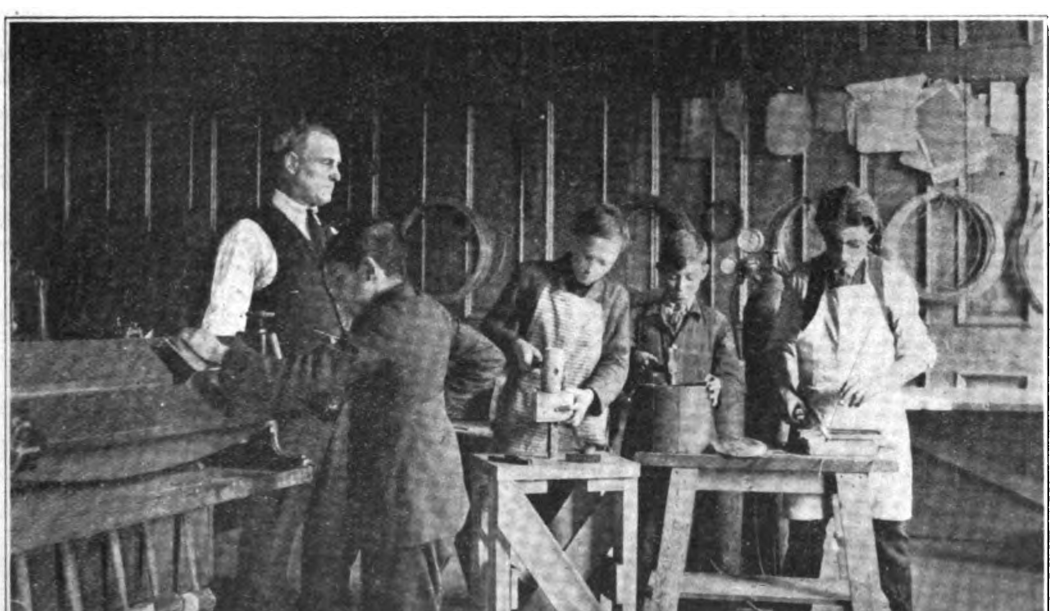
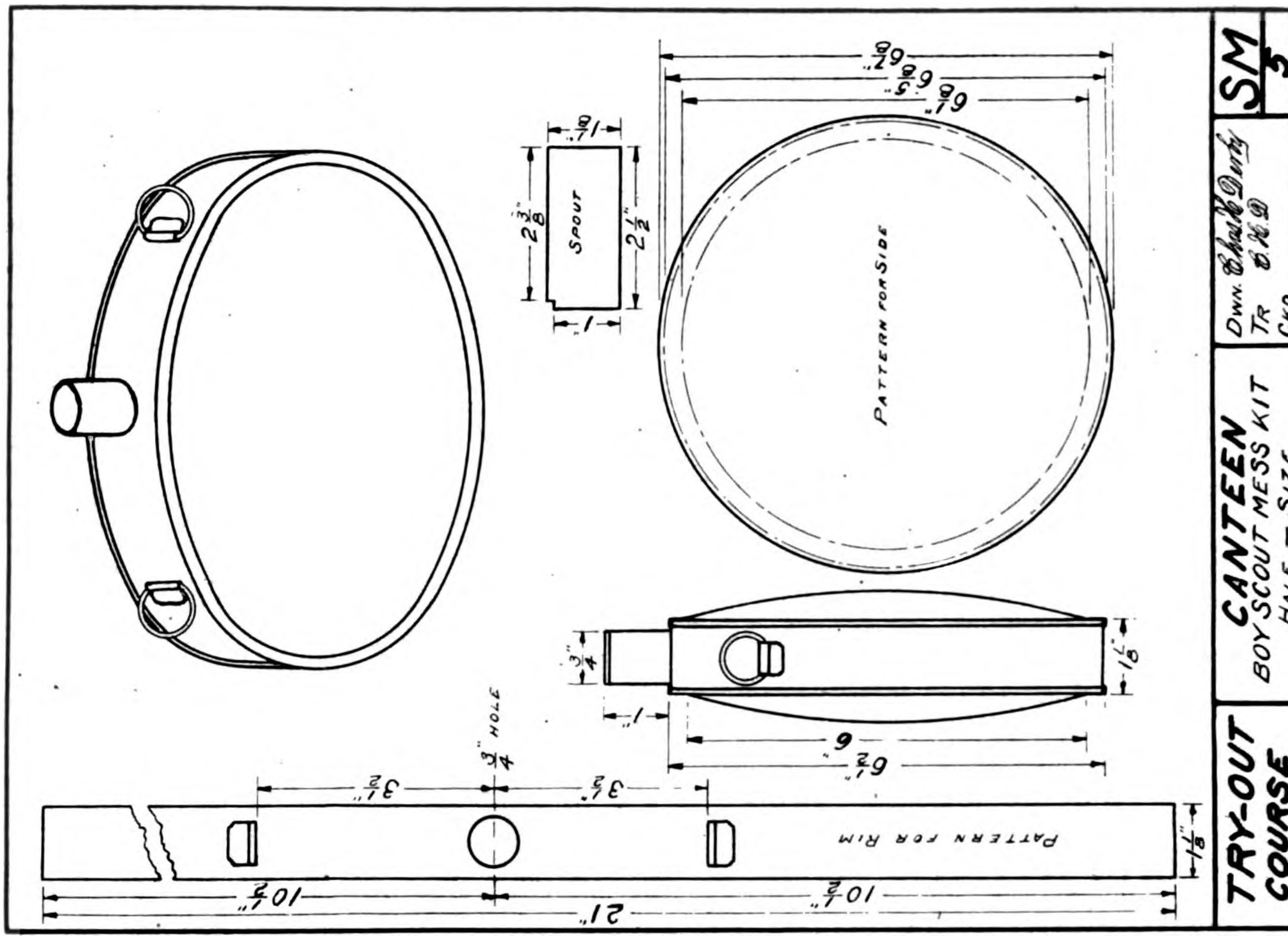


FIG. S. M. 8. PORTION OF A CLASS AT WORK.



frying pans are discussed. The allowance for wiring the edges must be worked out, the decimal diameter of the wire being taken from the side of the wire-gauge opposite the number of the wire.

Demonstrations are made on how to form edges, how to turn for wiring, how to measure and bend wire to form and how to cover the wire.

A clip, similar to that on the cup, is riveted in place and the handle made of number 9 wire bent as shown in Figure SM3, with a bar welded across the top so as to allow of an extension handle of green wood to be used when the frying pan is used in cooking.

Here the oxy-acetylene welding process is introduced. The gases used are explained, the pressure at the tanks, the safety-first precautions to be used, the proper mixture of gases and the manner in which the torch should be handled. This is not so difficult to impart to junior-high-school boys as it may seem. In the course of our two years' experience with this apparatus we have had no serious trouble in teaching the elementary operations of the oxy-acetylene welding apparatus. Fig. SM8.

A blueprint of the grate is furnished to each pupil. Fig. SM4. Wires are cut and formed as specified. In reading the blueprint of the grate, attention is given as to whether the measurements should be taken inside to inside or inside to outside. The welding is conducted under the direct supervision of the teacher or of a boy who has shown unusual aptitude in handling the torch. When the grate and frying pan handle are welded, the mess kit is complete.

In order to increase the scope of the try-out course, we have added to the mess kit a tin canteen, a very necessary object for field work. A blueprint of the canteen is furnished. (Fig. SM5.) The sides are marked out with the dividers and cut with the hand snips or circular shears. Great care is taken to demonstrate the process of raising the sides to the necessary curvature. After being raised, the sides are measured and the difference noted. This gives the amount that must be allowed for raising. About ½" around the edge is laid off flat by use of the turning machine. A burr is next turned at right angles on the edge. The rim is cut to the length indicated, a ¾" hole punched in the middle and the rim formed on the forming rolls. It is next placed inside the burr on the side piece and expanded until it fills the burr. The lapped ends are then soldered. Finally, both sides are placed in position and soldered neatly to the rim.

The spout is made of a single piece of tin and soldered in place. The rings for the sling are formed in the shape of a coil spring, cut off, and one side of the circle flattened. A clip is made as shown and soldered to the rim three inches on either side of the spout. The canteen is then tested to make sure that it is water-tight.

This completes the boy scout outfit. A picture of the completed kit is shown, Fig. SM6. How it looks in use by the original maker may be seen in Fig. SM7. The principles are taught in an interesting way and the result is something which every junior-high-school boy wants to have for his very own.

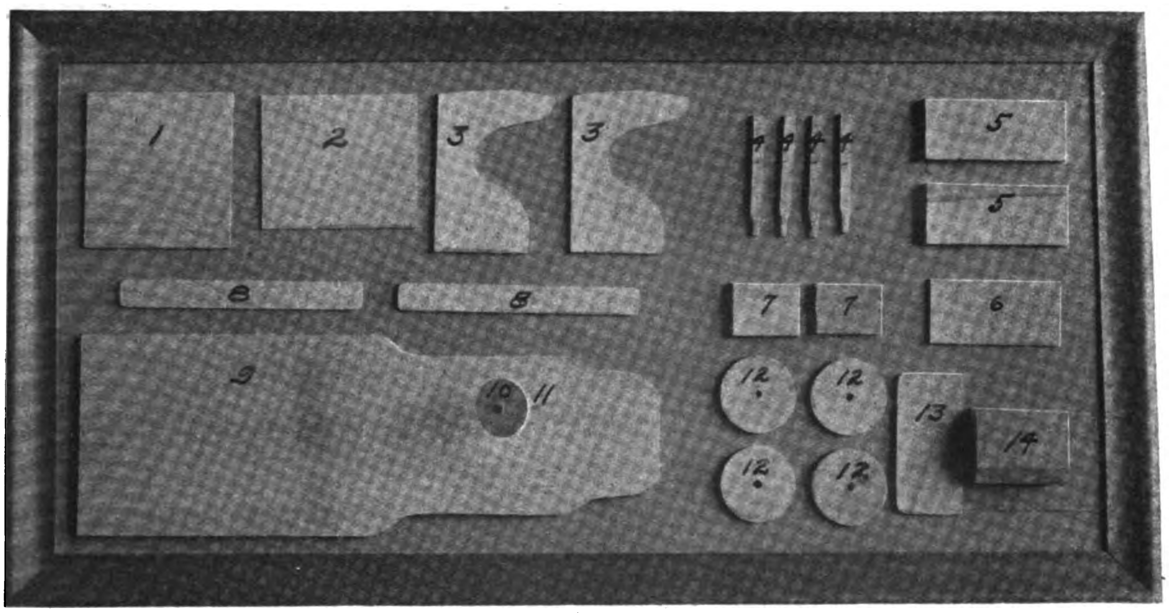


FIG. 1. PARTS OF TRUCK.

The Toy Truck as a Grade Woodwork Project

Fred L. Curran, Supervisor of Practice Teaching, Stout Institute, Menomonie, Wisconsin

THE toy truck when well designed furnishes an excellent project for boys from the sixth to the eighth grade. It has many elements of interest which may be utilized while developing the necessary skill and dexterity in the use of tools. The one here described is designed simple enough so boys will be able to make each part well. When completed it is much appreciated by every boy. It is made strong enough to withstand the ordinary rough usage which it is likely to get at the hands of a boy. All parts (except the steering wheel and post) are carefully nailed together with long enough brads and nails to insure strength. Most of the nails and brads should be driven at an angle which will add much to their holding power. The round-head screws used to fasten the wheels should be about two inches long and about 14-gage. Other details regarding construction and assembling should be worked out by the teacher beforehand and also developed with the class as the work proceeds.

While it is entirely satisfactory to have the toy truck made as an individual project it is here offered as a suitable group project or a production project.

Planning the Project.

Let us assume that we have two seventh grade classes with a total enrollment of thirty-five boys in both classes. Thirty-six trucks would be a good number to make in these two classes. When finished, each boy will have one of his own and there will be one for the teacher to retain as a sample.

Before starting the work we must see that plans are carefully made regarding the storage of stock and unfinished parts. In Fig. I are shown the parts needed to complete the truck. Fig. II shows a lumber stock rack. It will be well worth while for the teacher to plan the arrangement of stock and parts in the stock rack before starting the project. A simple and effective way is shown. The numbers on the parts shown in Fig. I correspond to the numbers on the stock rack. This means that as the lumber is cut from the boards for the several parts it is stored in the proper place in the rack according to name and number of part. The exact number of pieces should be cut and placed in the rack before beginning to make the truck. This number should be checked carefully in order to know whether pieces are spoiled in the making. The cost of each part should be

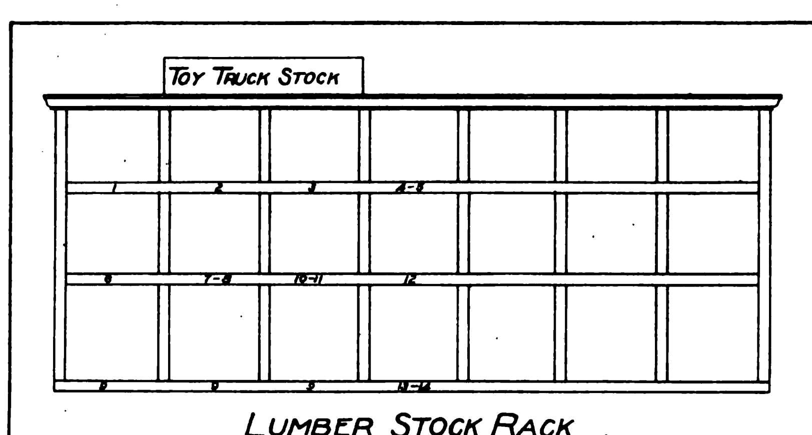


FIG. 2.

FIG. 3. THE "JOB" IN PROCESS.

carefully calculated by the boys as a part of the work of the class.

Making and Assembling.

After all preparations are made regarding stock and storage and the class is ready to start to make the parts the teacher will carefully organize each class into a working unit. He will appoint foremen over groups of boys and the foreman will be given the details of the particular job which his group is to execute. These details may be given in the form of drawings and specifications. The foreman is then held responsible for the work done by his men. He is to see that they understand just what is to be done and how it is to be done. An inspector may be appointed to inspect and test finished work, altho the foreman will need to do most of this work in order to be sure it is being done right from step to step. The teacher will assign the work to the several groups according to the abilities of the boys in the groups. The work should be assigned in such a way that assembling and painting can be begun very soon after the tool work is started.

Considerable time and emphasis must be given to the system of working in order that the boys will appreciate that part of it and in order that the work may run smoothly.

Fig. III shows a shop in which the toy trucks are being made. The parts are stacked on the benches where

FIG. 4. READY FOR ASSEMBLY.

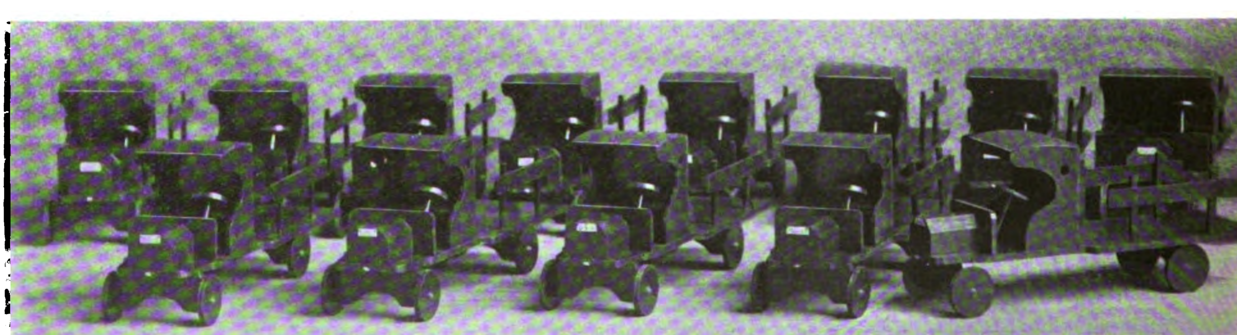


FIG. 5. THE FLEET OF TRUCKS READY FOR DELIVERY.

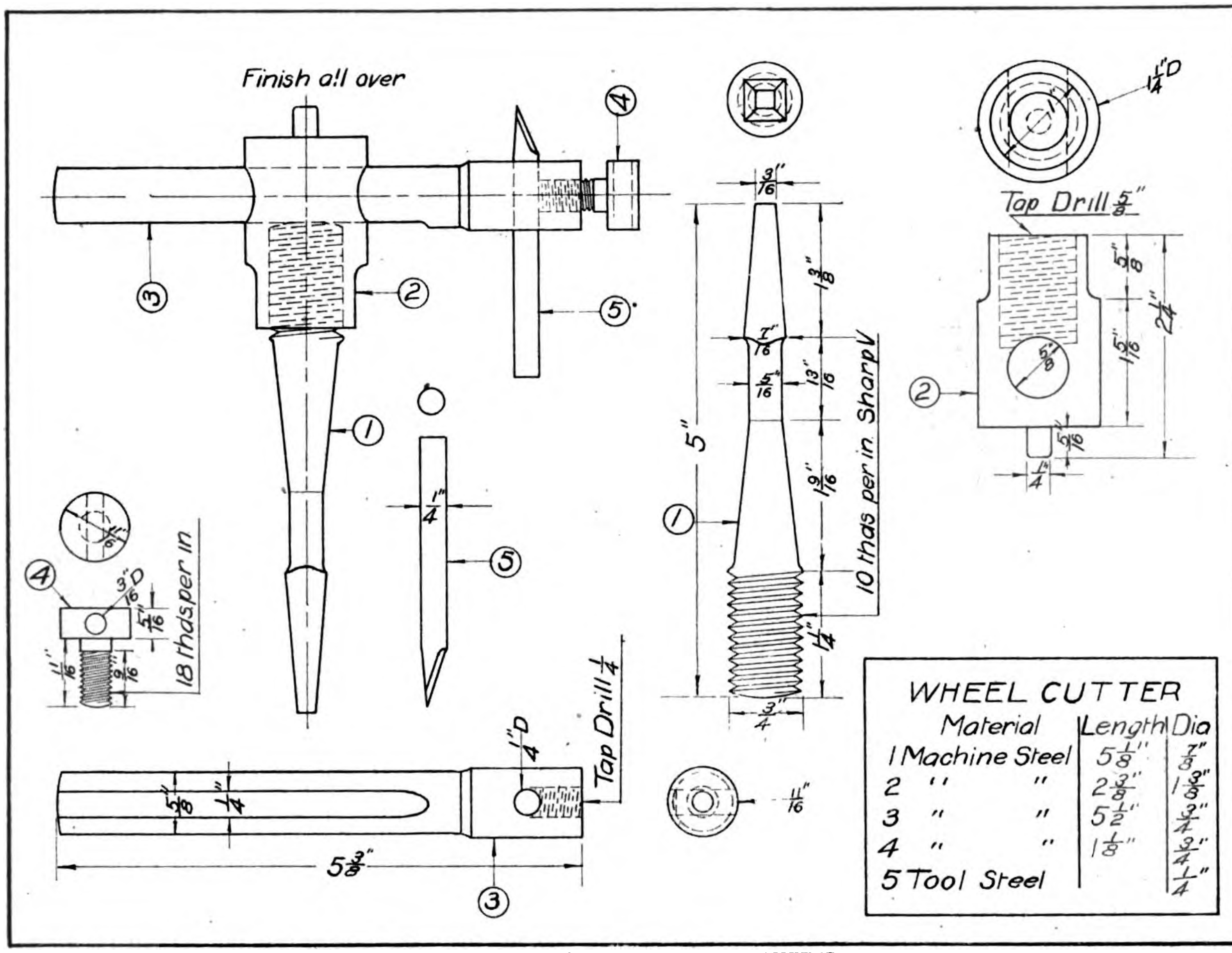


FIG. 6. DETAILS OF THE WHEEL CUTTER.

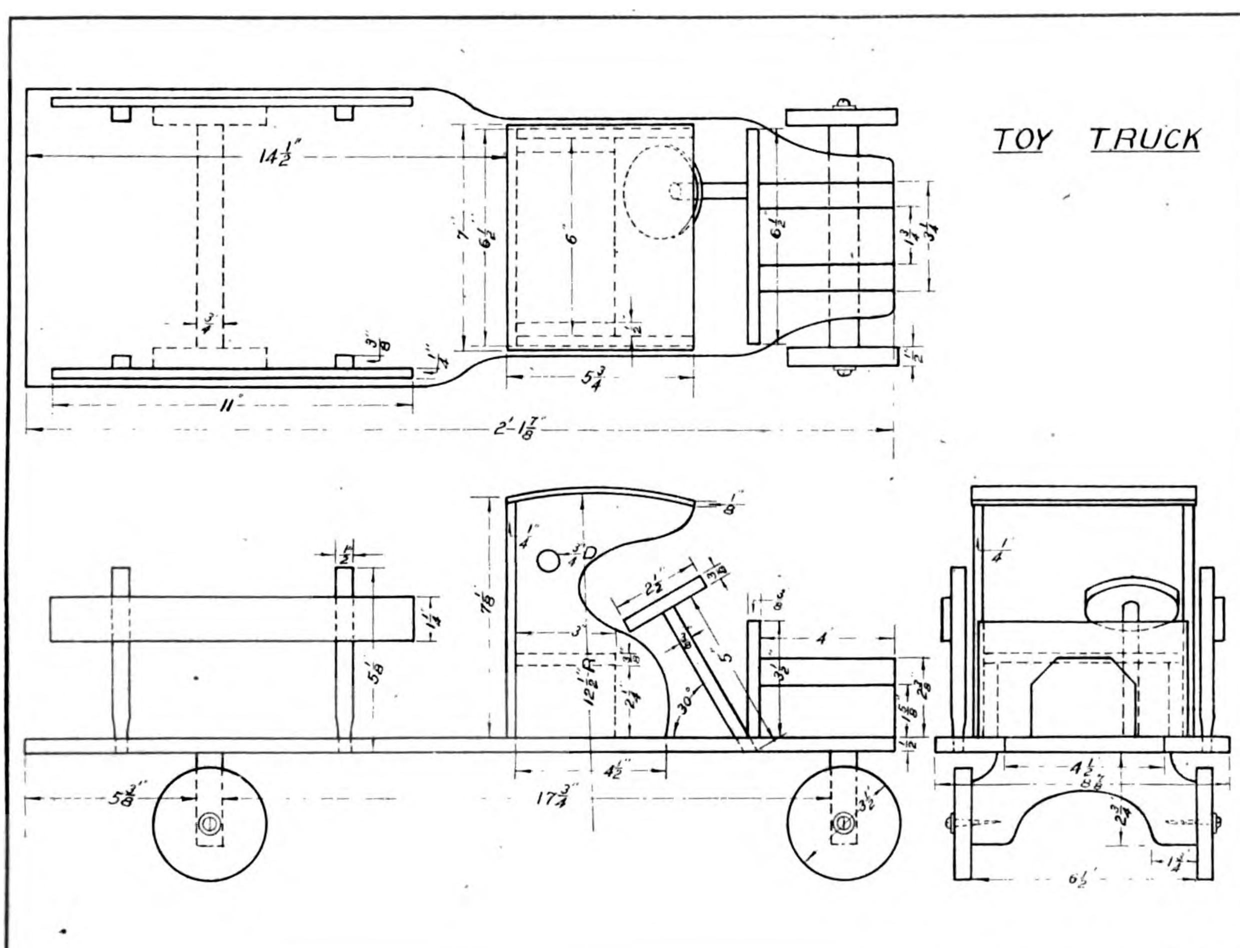


FIG. 7. DETAILS OF THE TRUCK.

the next operation is to take place. As a boy finishes a certain operation he passes the piece to the foreman or to the next crew as instructed by his foreman. At the close of each class period the finished and unfinished parts should be carefully stored in the rack and the number of pieces checked.

It is usually desirable for each boy to keep a time card showing what jobs he has worked on and the length of time on each.

Fig. IV shows parts painted ready for final assembly. Fig. V shows trucks assembled ready to be pulled away.

Use of Jigs.

In the production method naturally many jigs and other labor-saving devices will be used. There are three important reasons for using jigs in such a project. First, it enables the work to be done faster, and this encourages the boy; second, it helps in making the parts interchangeable; and third, it shows the boy the value of the use of jigs in factory work.

As the work is started the teacher will explain and demonstrate the use of jigs and show where jigs will be needed in making the truck. Then each foreman, with his group, will make such jigs as are necessary. Of course, the teacher will need to help with many suggestions regarding the construction of the jigs. When the jigs are once made they may be used by other classes altho there is a value that comes in the making of the jig that should be kept in mind by the teacher.

Cutting Wheels.

The wheels are made with a wheel cutter used in an ordinary bit brace. In Fig. VI is shown the details of this tool. It is not on the market but can be made in any machine shop at a small cost. The use of this wheel cutter makes it possible for the boys to cut wheels true and in a short time.

In the making of this project soft woods such as bass, pine, whitewood, butternut, or poplar can be used, and since it is to be painted more than one kind may be used in the same truck. A good quality of paint such as wagon and implement paint should be used. This gives the truck a finish that is attractive and durable. In having boys in industrial-arts classes make toys of any kind the teacher should hold a high standard of design and workmanship. He should aim to have toys made that are better than most toys that are on the market. The toy truck makes a strong appeal to boys and if well made should be beneficial both from the standpoint of the educational development of the boy and in the holding of his interests in good construction work.

The Wonderful Samplers of our Great-Grandmothers

Kitty Parsons, Brookline, Mass.

MANY long years ago, it was the duty of every well-brought-up little girl to work a sampler; but those days have long since disappeared, and I am sorry to say that this praiseworthy custom has gone with them. It is no longer a part of the child's education to learn to become dexterous with her needle—in most cases this is a mere matter of chance. In the old days, little girls, big girls, and even grown women spent much time with their needlework, and some of the specimens of samplers which have come down to us from our ancestors are truly wonderful examples of their exquisite workmanship. I think they must have had more perseverance and patience than we have today.

The sampler as a piece of work had a two-fold mission; it taught the alphabet and the stitches at the same time. Boys as well as girls did some of this work and a few of them were actually made by grown men. One of the very earliest given records of a sampler is one wrought by the poet, Skelton, (1469-1529). He speaks of "the sampler to sowe on, the laces to embroide." I cannot imagine any man today sitting down to this sort of work.

A great many poets have referred to the sampler in verse. Sidney, Shakespeare, Milton and Herrick have all mentioned it, which shows us again how universal was its use in those times, when women as well as children had more time to give to the quieter pursuits of life than they have today. The earlier the date, the deeper the interest we find that needlework possessed for women, and also the better the work that they did. The very best samplers that we find were made in the middle of the seventeenth century.

The best way to tell the age of a sampler is by studying the ones whose age is known and comparing them with the others. The style and form of the letters of the alphabet which appears on most samplers is one way of telling the age. The verse is another. The earliest samplers had neither alphabet nor numerals and they are far more irregular in form than the later ones. These were made rather as a sample of work and stitches which could be used as a copy, than the later ones were. Most of the samplers worked during the past two hundred years are dated, so there is little difficulty in placing the exact age. During the eighteenth century, animals, flowers and people were sometimes worked into these samplers and some of them are remarkable looking in shape and features.

Great examples of diligence are shown now and then in the appearance of whole chapters from the Bible, neatly embroidered for others to read. The 37th chapter of Ezekiel was worked on a sampler by Margaret Knowles in 1738, and in 1737, Elizabeth Greensmith wrought the 134th Psalm. More recent workers do not appear to be quite so ambitious and quotations are considerably shorter.

The work of some of the old samplers is so truly exquisite that it is believed that few of them were the work of very little children. There are one or two remarkable examples of the work of children of 6 and 7 years, but the majority of them are the work of older children, and sometimes of women.

Some of the verses we find are very amusing. One which was found on an American sampler is this:

"Mary Jackson is my name
America my nation,
Boston is my dwelling place,
And Christ is my salvation."

The square sampler in the picture has this verse:

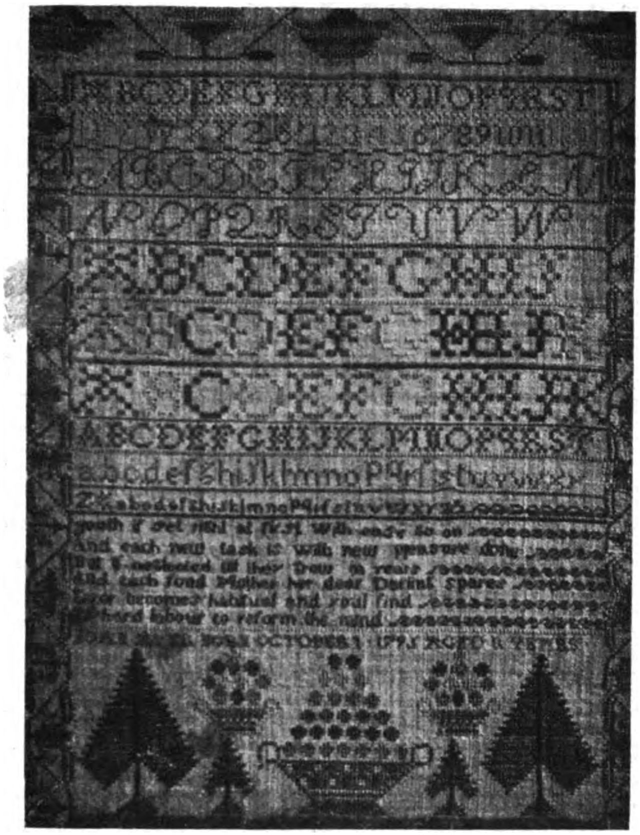
"Seize the kind promise while it waits,
And march to Sion's heavenly gates,
Believe and take the promised rest,
Obey and be forever blest."

This was worked by Catherine Walton, born 1784.
The other says:

"Youth if set right at first with ease go on,
And each new task is with new pleasure done,
But if neglected till they grow in years
And each fond Mother her dear Darling spares,
Error becomes habitual and you'll find
Its hard labour to reform the mind."

This was worked by Joan Ayer, born 1790. The same verse, slightly different in wording, is found on a beautifully worked sampler, wrought by Ann Maria Wiggins, aged 7 years, some time during the nineteenth century. It has a goldfinch embroidered at the top and the entire verse is surrounded by a mass of embroidered flowers. It was one of the most elaborate samplers in the Bond Street Exhibition, and one of the most remarkable known examples of a child's work.

A SMALL SAMPLER.



A LARGE SAMPLER.

Another verse found on an American sampler, worked by Martha Barton in 1825 is:

"When wealth to virtuous hands is given,
It blesses like the dews of heaven
Like heaven it hears the orphans cries
And wipes the tears from widows eyes."

On Martha Hooten's sampler in 1827, is written:

"I love the man who scorns to bend,
Beneath affliction's blast,
Who trusts in an Almighty friend
For his reward at last."

There are many other old specimens, some funny, some painfully serious, and all of them extremely interesting.

As an artistic piece of embroidery, the sampler is on the decline, for the few recent examples which are to be found, cannot compare in workmanship with those of an earlier period. This is a busy age in which we live and even a child today is not content to sit quietly stitching when she might be doing other things with a far stronger appeal. But it is very interesting to look among the old things that belonged to our great-grandmothers and see if we can't discover an example of their patience and diligence, even if we lack those same qualities or at least the desire to apply them in this way, for ourselves. Who knows but we may yet be inspired to take up this oldtime art again some day when there is a lull in the mad rush of events?

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

SUCCESS.

WHERE is the self-made man who used to tell us thru the columns of our popular magazines just how he succeeded? We felt a little jealous of him, not because we thought him so superior as his confession indicated, but because we were convinced that in spite of his frugality, he had unusual opportunities that did not exist for us. Now we are not so jealous of him, for we suspect that his position is not so desirable after all. His frugality may have developed ability to avoid some of his income tax, but we are not subject to that exercise of frugality. We are learning slowly that his hard earned financial success was of a rather poor sort, unless he had some qualities that did not appear in his confession.

A peculiar reaction on the part of teachers to emphasis on their "pitiful condition of employment" is evident. We have lately heard teachers grow eloquent in resentment against the assertion that their profession was one of self-denial and abnegation. We join with them in the assertion that it is a profession second to none in opportunity for ambitious and honorable success.

OBEDIENCE TO LAW AND THE PART-TIME SCHOOL.

In the states where the compulsory part-time law goes into operation in September, 1921, many of the cities are finding themselves in difficult situations. Unless some sort of relief comes in the form of additional legislation with reference to the tax rate, this promising and important type of school work seems doomed to tremendous handicaps at the very outset.

Many school administrators are beginning ahead of time under the "optional mandatory" feature of the law, while others take a decidedly belligerent attitude and proclaim with some heat that they don't propose to try to do anything with the work even next year, in spite of the law, adding this very curious explanation, "since there is no penalty attached to the violation."

May we not raise the question as to whether this is not a rather low level on which to put obedience to law, especially when so placed by people who are supposed to teach our children that the fundamental compulsion of law is the moral obligation which it lays upon all good citizens?

There are abundant reasons why some cities will obey the law under great difficulties and why others by the very necessities of the case will be compelled to postpone the opening of the part-time schools. But no school man should ever give as his reason for failure to start the work the fact that no penalty attaches under the law to its infraction. And wherever it is at all possible, some sort of a start should be made in the hope that at least limited opportunities may be opened for those young workers who are so much in need of training, inspiration, and guidance.

THE VALUE OF BREVITY IN THE PART-TIME SCHOOL.

In an army hospital some soldiers were being given some work in bookkeeping and commercial forms. Their probable stay was limited to seven weeks, on the average. The teacher, who was a university graduate in accountancy, was asked what he was doing for the men. He replied, "I'm giving them the first seven weeks of the four-year course."

He had not caught the idea that in so brief a time what those men needed, if anything in his line, was some simple helps in the commonplace, everyday tasks of the corner groceryman, drayman, order man, timekeeper, watchman, clerk, etc.

The very shortness of the time of the part-time school is going to force teachers to eliminate a great mass of the verbiage and the nonessential matter in their work and to get right down to the heart of it at the very first meeting of their classes. The proposition of part-time classes still has to be *sold* to many boys and girls who are forced back to school. It cannot be made to appear as perfectly vital and indispensable, if it is put on the basis of the rather hazy, indefinite, "general" type of instruction often found in the regular school work. It must be a clear, definite message that appeals to the sense of values in working boys and girls.

This, of course, means a reorganization of the courses of work, a more direct method of instruction, and a treatment of the material in the spirit of determination that the brevity of time shall not deprive the pupils of the *essence* of what the teacher has to offer.

TWO GREAT MEETINGS.

On February 10, 11 and 12, in Minneapolis, the Vocational Association of the Middle West will hold what promises now to be one of the greatest vocational meetings ever held in this country. Concessions have been made by the railroads for a reduced fare. Arrangements have been made in the Twin Cities to care for the Association in royal fashion. One of their spokesmen assured us that they "would show us a hot time in a cold climate." And any reference to the climate always brings the comforting assurance that "*you never notice the cold up there.*"

The preliminary programs are out and are being distributed. Extra copies may be hald by addressing Prof. E. A. Lee, University of Indiana, Bloomington; or L. A. Wahlstrom, 1711 Estes Avenue, Chicago.

Two weeks later, in Atlantic City, the National Society for Vocational Education will hold its annual meeting. The advance program has not yet appeared, but advance information assures the usual strong program that has always characterized this organization's

meetings. It seems almost a calamity for one to have to decide not to attend both these meetings. This is the year of reorganizations, new projects, new legislation, and new opportunity, and these meetings should clear the way for united and vigorous attack upon the various problems that confront the vocational people.

A GOOD-RESOLUTION.

Perhaps the best resolution that could be made by those who talk and write about education would be one tc confine themselves this year to perfectly definite, understandable, simple statements concerning practical, desirable, and attainable ends. Wherever education has been discussed, it has almost invariably fallen into a kind of pseudo-intellectual, "high brow" jargon that was as meaningless as it was useless.

The new emphasis in education is on the functional phases and values of it. There is a strong and growing feeling that the best way to train boys and girls for tomorrow's duties is to give them such vital work as functions at once in *today's* needs and desires. That is, the arithmetic, civics, and physiology that will best meet the demands of the immediate future are such phases of arithmetic, civics, and physiology as are significant in the daily lives and experiences of the pupils and as they see functioning in their intimate relations with the world and its work.

If one asks questions concerning education or desirable modifications of it for specific ends, one receives dissertations couched in the most general, all-inclusive terms which mean absolutely nothing that can be made use of. In an educational meeting, the desirableness of personality and its cultivation was being stressed. Someone asked, "What is personality?" The reply quoted a noted scholar to the effect that, "Personality is the sum total of all of the desirable human traits!" Pray, what good does any such an ingenious confession of ignorance do? What the enquirer wanted to know was how personality functions or manifests itself, what are its characteristics, whether it differs from character and how, and the simple elements of behavior that make up that desirable possession.

Let educationists resolve at least for this year to quit talking pedaguese and to get down to definite, one, two, three facts that are usable by the ordinary teachers in the ordinary schools. This will be a great year for education, if this advice is taken; but it will almost destroy teachers' conventions and general writings on pedagogy and education.

IDEAS UNDER A BUSHEL.

Some teachers have peculiar and unprofessional notions in keeping secret new ideas which they have developed in their shop and classwork. This seems to be especially the case with men who have come into the schools thru the industries and who have carried along with them worn out ideas of trade secrecy. They overlook apparently the fact that all progress in education has come from the interchange of ideas and experiences and the adaptation of new theories and methods to new situations. In this connection it is interesting to read what a writer in The Woodworker says:

For some reason or other the natural tendency is to "keep mum about trade kinks." When a worker, foreman or anyone else discovers an easier way to do something, he hastily looks around to see whether or not anybody saw him do it in the newer or better way. He thinks to himself, "This kink is too valuable to reveal to others; I'll keep it to myself and it may help me some time." He continues to do the work the old way, because the new way is his secret, and he fears somebody will steal his idea from him. The longer he keeps it the more valuable it seems to him; he never lets go of it, and perhaps lives to see some one else discover the same trick. The "other fellow" tells about it in the technical or trade papers, and forges rapidly to the front.

Ideas are valuable, true enough, but they are of no value whatever if they are not used. If an idea is good, is patentable and seems to be worth patenting, the thing to do is to take out a patent.

Many ideas that are good are not patentable. For example, in many plants time and energy are lost blowing dust and lint out of machines with hand fans. That is the way it always has been done, and for that reason the foremen think that is the way it must be done. A girl who had to do the work in one plant suggested, one hot day, that the foreman furnish her with an electric fan for doing the work. He "tumbled" and furnished the fan. It worked nicely, did the work better, more quickly and did not cause the girl to overexert herself. Many little improvements of this simple nature are possible in and around the plant.

A friend of mine explained it to me in this way not long ago. He said, "Let us trade dimes. You give me a dime for one of my dimes." We traded. Then he said, "We haven't progressed a bit. You are no richer than you were before." I agreed with him. "Now," he said, "let's trade ideas. You tell me how to rearrange my belting system to save power and I'll tell you how money can be saved on lubricants." I agreed, and we traded ideas. He then showed me that we were both richer in ideas.

The progressive man isn't afraid to tell what he knows or ask questions about what he doesn't know. He doesn't keep his light under a bushel.

DEVELOP LEADERS.

Your true democracy must have leaders; and the better the leaders, the better the democracy. These leaders must be men of the most gracious and sincere manners, the most cultivated imagination, the finest self-sacrifice, the highest ideals. Wherever we need leaders, we need just such men. And such men do not just grow. They must be developed and inspired somewhere.—*E. W. Parmalee.*

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

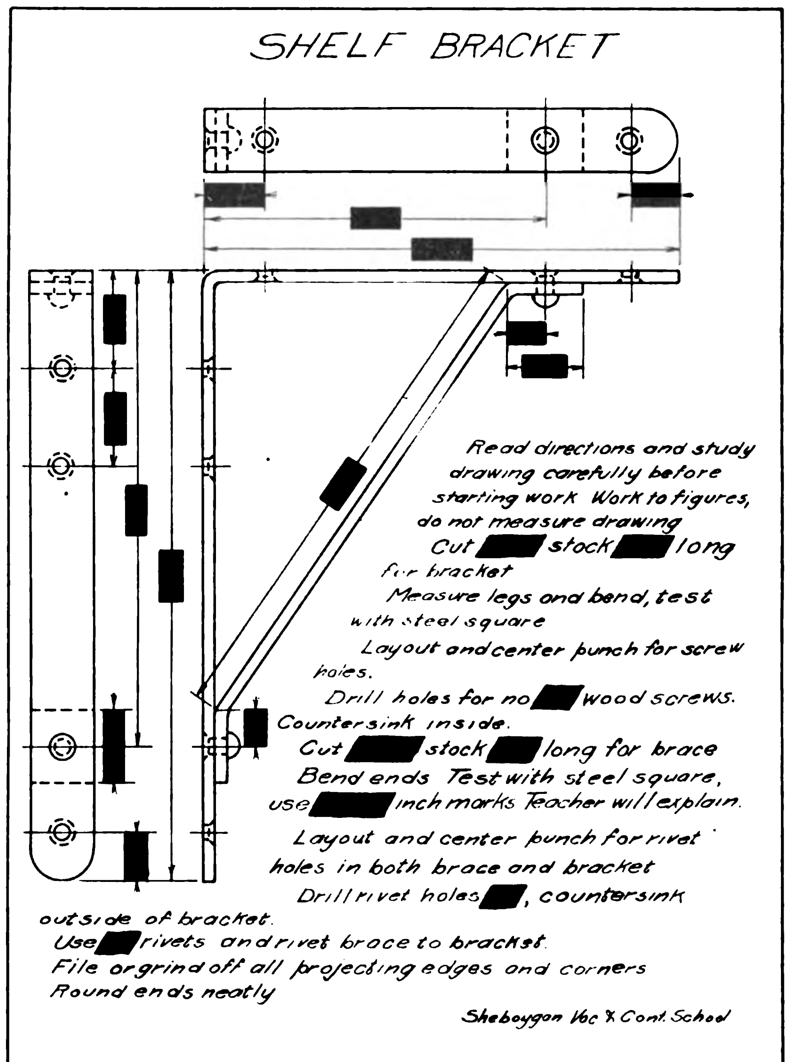
Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A METHOD OF PRESENTING PROBLEMS.

J. G. Childs, Sheboygan, Wis.

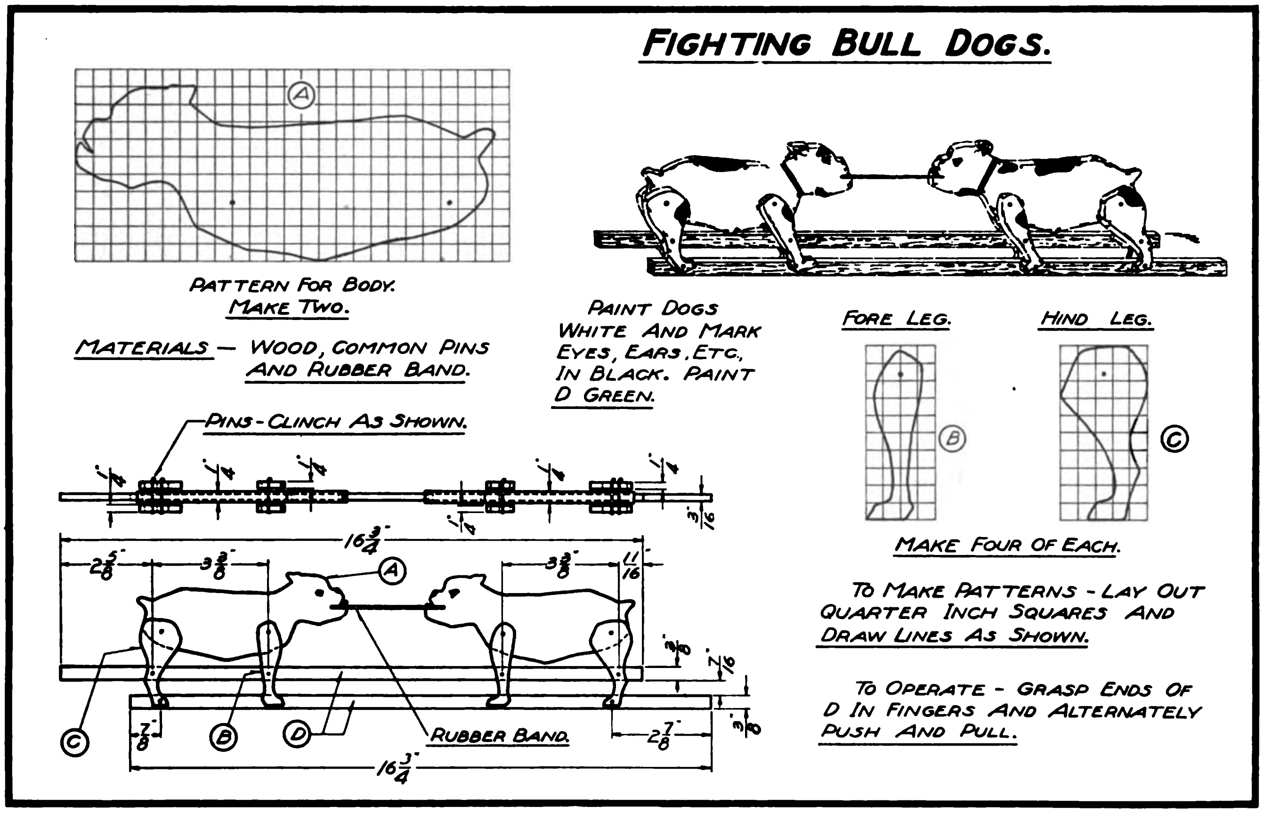
The accompanying drawing and lesson sheet are illustrative of a method of presenting problems in part-time vocational classes. Students in such classes range from fifth and sixth grades to high school students and are with the class only two or four hours a week. For the most part, they have no idea of the sequence of operations, or of proper methods of procedure. The personnel of the classes changes constantly and it is seldom that two students are ripe for the same problem at the same time. Under such conditions it will readily be seen that a class demonstration is of doubtful value. Teachers of classes of this type must organize their work and divide their time, in such a manner as to give the greatest amount of individual attention to each student.

The use of job drawings and lessons is one practical solution of the difficulty. It is desirable that each job be divided into steps in the proper order and that definite instructions be given for each step. This eliminates repetitions and vague verbal instructions and gives the student a measure of training in the reading and understanding of drawings and written instructions. The teacher need not constantly answer non-essential questions, but can devote his attention to the students who need it most. Thus, students are not deprived of individual work, but are put on their mettle to ask for what help they actually need. The plan has the advantage of making it possible to give an entire job to a student, or to pass on each step separately as the student completes it. In either case, the boy receives such help as is necessary to start with, and the teacher is free to work elsewhere until the boy is ready for the next operation.



TYPICAL JOB DRAWING PREPARED BY THE AUTHOR.

No claim is made to originality. The writer has floundered around in this work for a number of years and in that time has seen many others apparently as hopelessly mired. Most readers will recognize the application of sound and well tried lesson planning to suit the conditions peculiar to our work. The project was selected on account of its simplicity and only to illus-



DETAILS OF TOY DOGS.

trate the method. Many lesson sheets are but rough sketches, with instructions written in, and made as occasion demands, but when it is considered that the high points are brought out more clearly to both student and teacher, the preliminary work is always worth while. So far as possible every job is assigned in this way and there is usually cause for regret when this is not done.

SCOUT KNIFE SHARPENER.

Kenneth L. McCullough, Plainfield, N. J.

This sharpener was planned to meet the requirement of a local Scout Master. Because it calls for the use of a number of tools, it makes a good project for the beginning of the year.

Each side is covered with one-fourth of an 8½"x11" sheet of emery cloth, using one or two grades of coarseness. The corners of the handle are slightly rounded, also the ends of the dowel, which is used to protect the hand.

FIGHTING BULL DOGS.

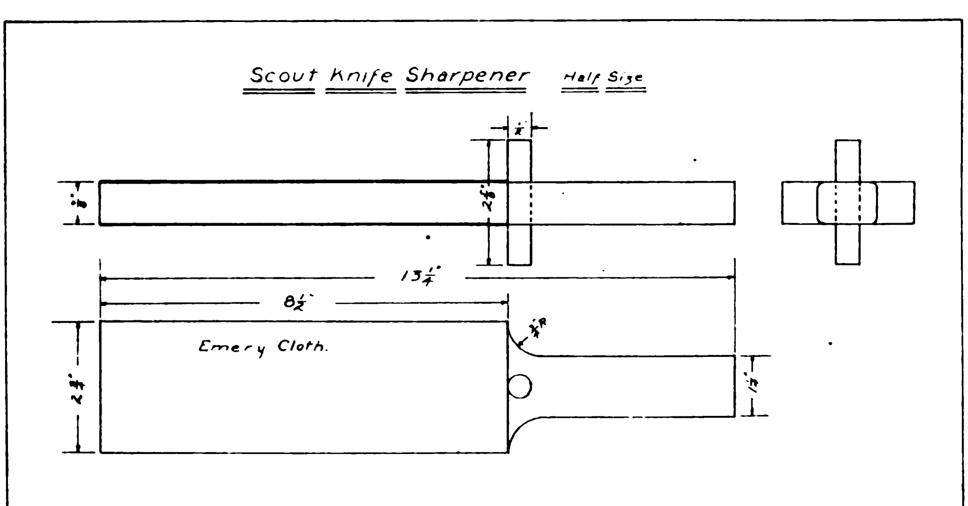
Frank I. Solar, Detroit, Mich.

The Fighting Bulls, as the boys named them, have been very popular in toy making classes and have been good sellers at our toy sales in Detroit.

As there are several parts to be made from each pattern, it is well to cut patterns from cardboard. The square method is used for laying out the patterns as shown on the drawing.

Use softwood for this toy and do the cutting with a jig or coping saw. Finish the edges with sandpaper. The required number of parts for the dogs are noted on the drawing.

The handles (Parts D) will have to be planed to size. These are the only parts that cannot be made from cigar box lumber. In Detroit we can buy bundles of clippings from the cigar factories. They are sold to the boys for kite sticks. Of course these long pieces are just the



DETAILS OF KNIFE SHARPENER.

thing for this toy, when planed a little thinner than the body of the dog.

Bore a hole for the rubber band in the mouth of each bull dog. Assemble the parts with pins, using a pair of round nose-cutting pliers to cut the points of the pins and turn the ends. Bore holes for the pins with a brad awl. If the one at hand is too large, make a small one by driving a brad in the end of a piece of stick and filing off the head.

Paint parts according to the scheme given on the drawing. The toy should be painted, after it has been tried out and before it is finally assembled. Show card water colors, covered with a quick-drying white varnish, will be found easy for boys to handle.

Study the drawing and notes carefully, before beginning the work, and do not make the usual mistake of fastening the feet of the front legs.

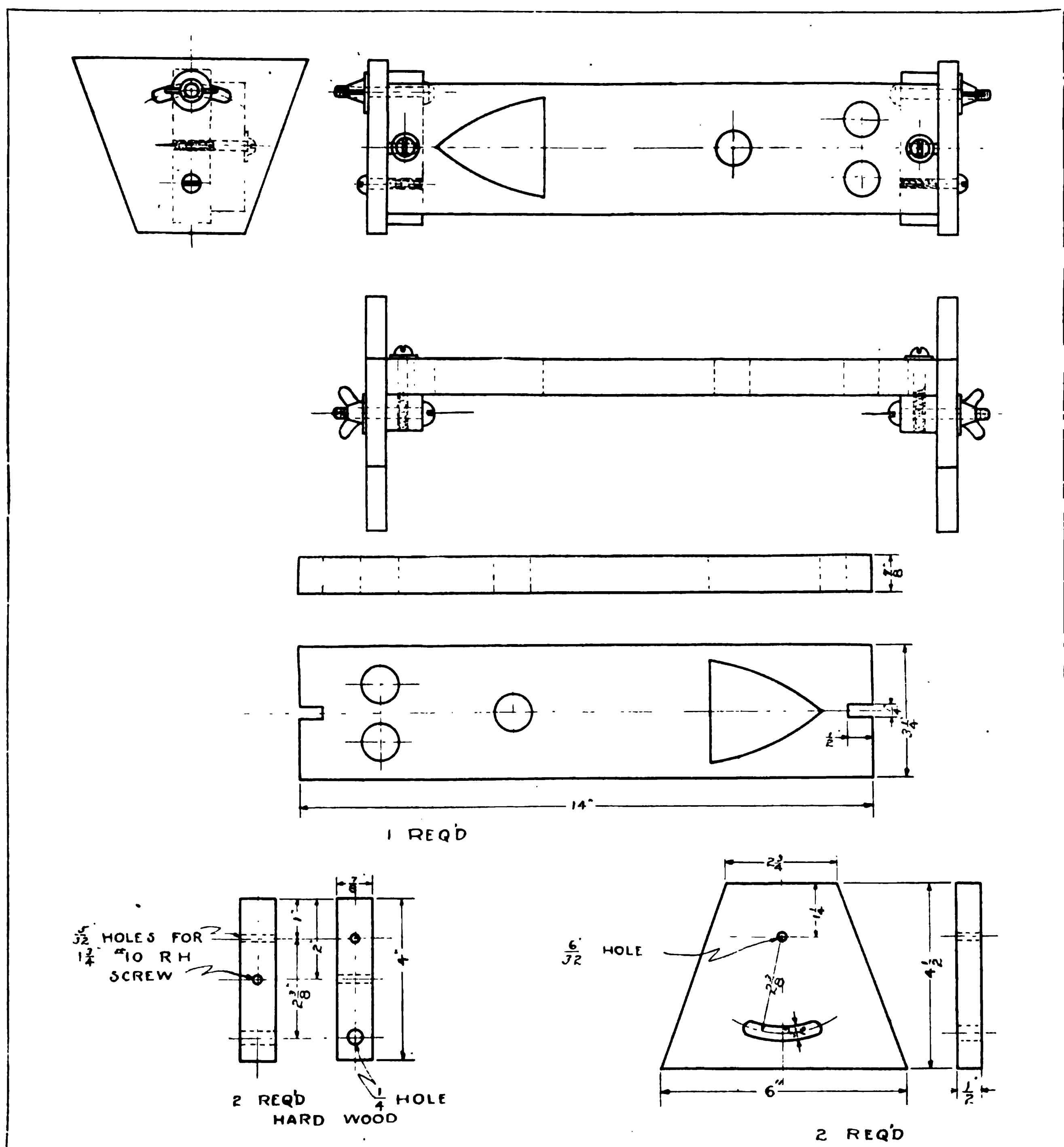
A JIG FOR SHARPENING SKATES.

Clyde D. Pierson, Central High School, Lima, O.

When the ice is good the boys are frequently asking for permission to sharpen skates in the school shop. The jig illustrated in the accompanying drawings was devised by the writer and his class for holding skates so that they can be hollow ground.

The board to which the skate is to be fastened is intended for use with clamp skates. No dimensions are given because the holes must be located to suit the skates to be ground. The various types and the extreme sizes of skates require slight variations in the boards. These are easily made and interchanged.

Place a board about three feet long horizontally before the emery wheel. Clamp the skate on the jig and adjust the angle so that the edge of the skate runner is tangent to the wheel. With a little care in making this adjustment a good job of hollow grinding can be done.



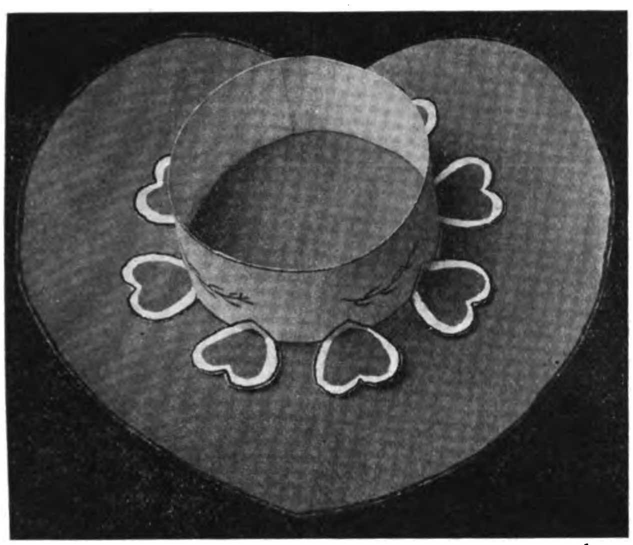
DETAILS OF JIG FOR SHARPENING SKATES.

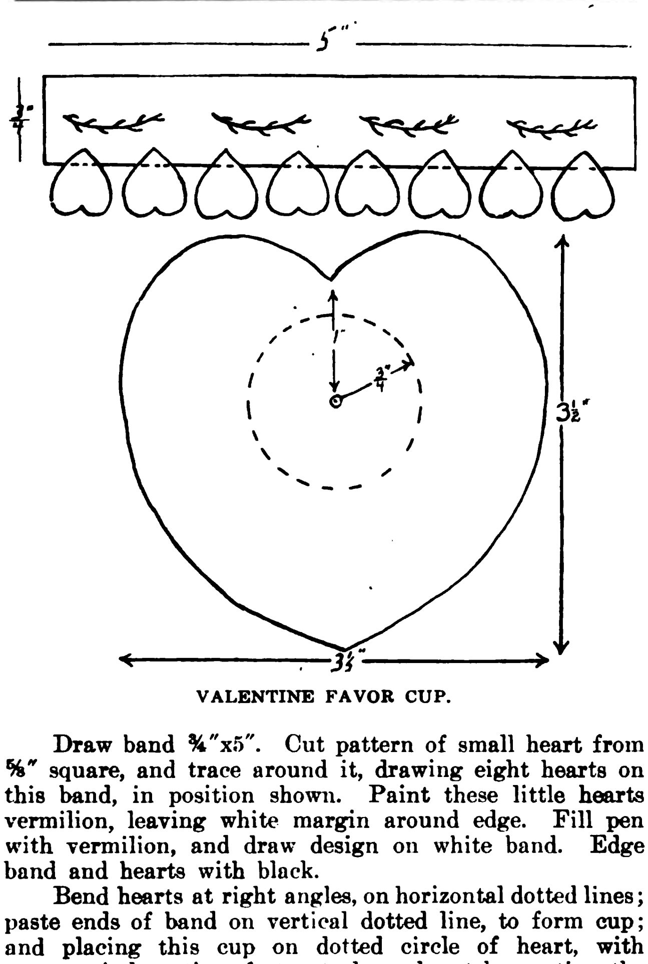
VALENTINE FAVOR CUP.

Grace Roberts, Des Moines, Ia.

Material: White drawing paper, watercolors and paste.

Draw heart (or cut on fold) from a 3½" square, and paint vermilion, edging with narrow band of black. From indentation of heart, measure 1" towards center, to find center of circle; circle has radius of ¾".





VALENTINE FAVOR CUP.

Draw band ¾"x5". Cut pattern of small heart from ⅝" square, and trace around it, drawing eight hearts on this band, in position shown. Paint these little hearts vermilion, leaving white margin around edge. Fill pen with vermilion, and draw design on white band. Edge band and hearts with black.

Bend hearts at right angles, on horizontal dotted lines; paste ends of band on vertical dotted line, to form cup; and placing this cup on dotted circle of heart, with seam at indentation, fasten to large heart by pasting the small ones in place.

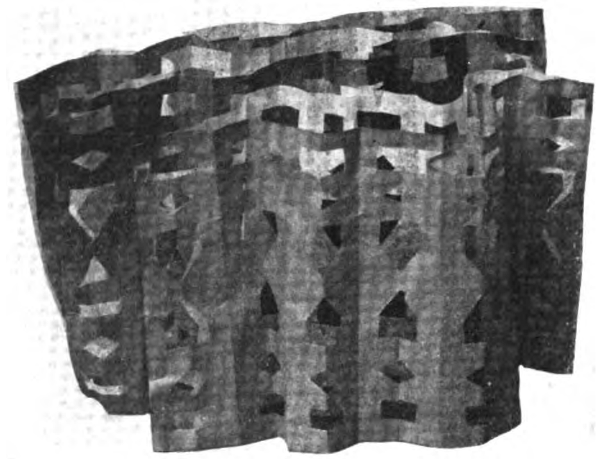
This is a very attractive favor, and not difficult to make. The great beauty of these trifles is the exactness with which they are made. So this is a problem offering practice in the application of a smooth wash, and demanding exactness of measurement—both of which are greatly desired in school work.

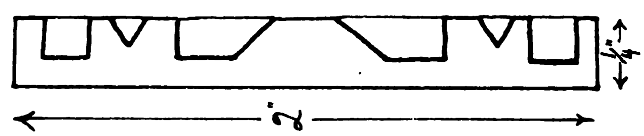
GARLAND.

Grace Roberts, Des Moines, Ia.

Material: If for patriotic purposes, use red, white and blue tissue papeer. Paste.

Cut tissue in oblongs 2"x4". Fold two-inch edges together, then fold center formed to edges again, and continue until the width of the fold is about ¼" wide. Cut design shown (or any other suitable design) on the center fold.





GARLAND.

Unfold, and lay red oblong on white, blue on another white, pasting the two-inch edges of each pair together; when all the papers have been pasted in pairs, attach the pairs to each other by pasting center of white to center of blue, the center of the next white to center of following red, so as to have this color order: Red—white—blue—white—red—white—blue, etc. Repeat to the desired length.

As this is a very simple garland, it can be made by even the little children, as well as being a joy to the older ones. It is very attractive when pulled out and hung in place.

A THREE-LEGGED MILKING STOOL.

Robert H. Smith, State School of Agriculture, St. Lawrence University, Canton, New York.

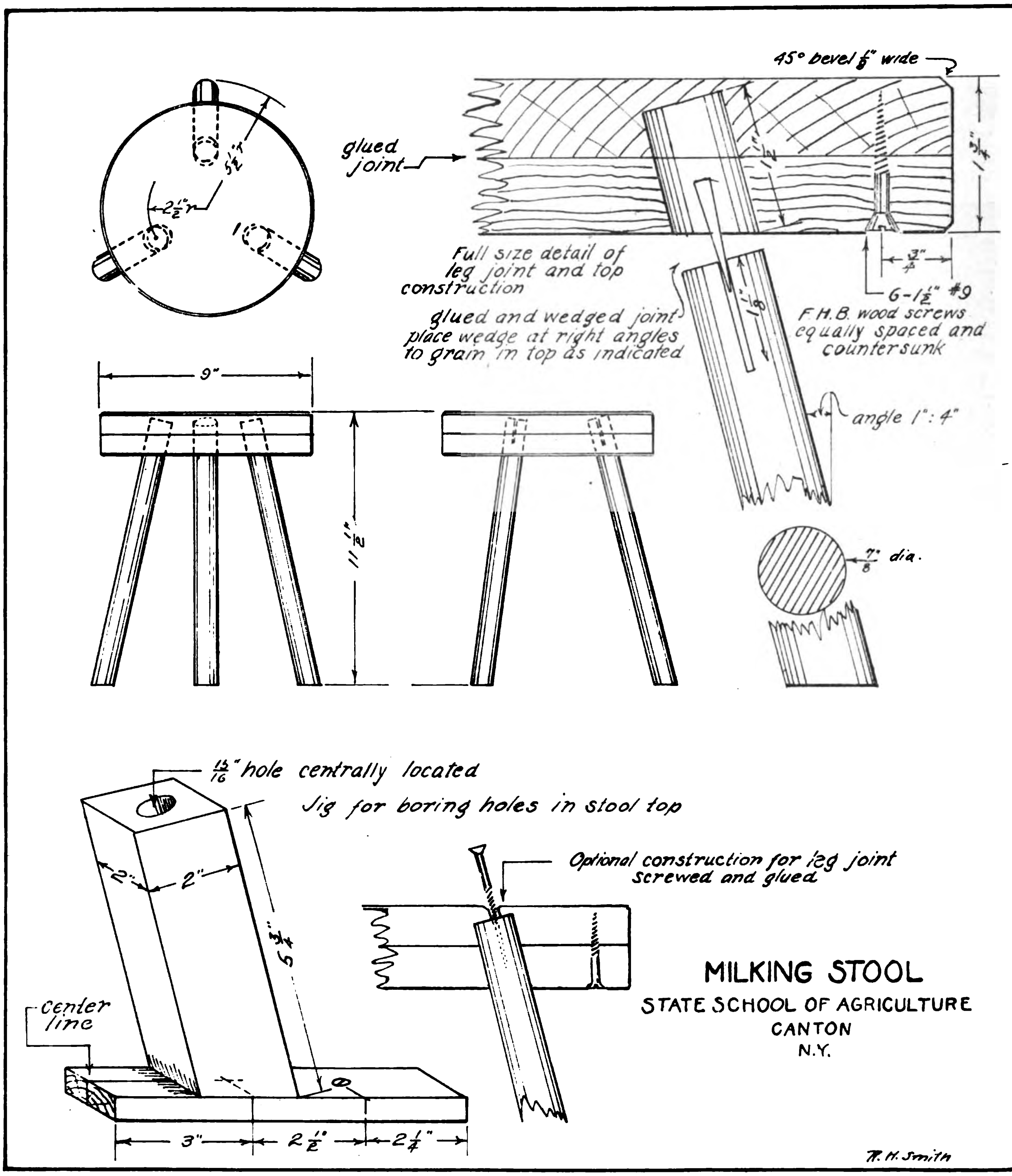
With the present high prices of materials not the least of the difficulties confronting a teacher of farm shop work is the selection of models that require little material and at the same time fill a definite need, securing the interest and best effort of the student and making him feel that something has really been accomplished when the piece is finished. The milking stool illustrated meets these conditions nicely. It is light, strong, neat-looking and useful, and when well made and taken home, performs the double purpose of advertising the work of the school and raising the standard of dairy practice as every neat piece of stable equipment does.

Required Materials.

Method of Construction.

Lumber.

No. of pieces.	Size and kind.	Where used.
2	10"x10"x13/16" pine or basswood S2S	Top
3	1"x1"x12" long, white ash or hickory, preferably split	Legs.
1	2"x2"x6" long, hard wood	Upright for jig
1	½"x2"x7¾" long, hard wood	Bottom of jig



DETAILS OF STOOL.

Hardware.

½ dozen 1½"—No. 9 F. H. B. screws for top.
One ¾"—No. 5 F. H. B. screw for jig.
4 6D box nails for jig.

Miscellaneous.

Liquid glue for fastening top, legs and jig.

Light gray automobile enamel, white lead, turpentine and oil, varnish to cover if desired.

Method of Construction.

1. Set the compasses at radius of 4½" and lay out two 9" circles on clear pieces of pine or basswood 13/16" in thickness, for the top.

2. Cut out tops with compass or turning saw, keeping edges vertical. (Band or jig saw may be used for this if shop is provided with either.)

3. Select best piece for upper surface of top and on the other piece, using the same center and a 3¾" radius (see detail) describe a 7½" circle ¾" from the edge. This is used in locating the screw holes.

4. With the same radius step off six equal spaces around this circle.

5. With gimlet or twist drill bore for No. 9 screws at these points and countersink.

6. Coat inner surface of top pieces with glue and clamping them together in the vise with grain crossed at right angles to prevent warping and splitting, fasten tightly together with six 1½"-No. 9 F.H.B. screws. Set aside to dry.

7. If straight-grained hickery or white ash block is available split out three pieces to dress 1"x1"x12" long for legs. If not rip these pieces from a straight-grained board.

8. Plane square, remove corners, making the stick octagonal, and finally finish round, making it a snug fit for a ⅞" hole. Make a test hole in a piece of hard wood to serve as gauge. Finish legs by scraping with glass

and sandpapering. Lathe may be used for this purpose if available.

9. Make a saw-kerf 1⅛" long in the top end of each leg to take wedge (see detail), and make slim wedges to fit.

10. From a piece of 2"x2" hardwood cut a section 5¾" long, making one end square and cutting the other at an angle formed by using 1" on the tongue of the square and 4" on the blade. (Note: This piece should be of just sufficient length, including the thickness of the piece used under it, to permit boring to the proper depth in the top as it serves the purpose of both a depth gauge and angle gauge. To provide for possible variations in bit lengths, the piece just described can be made somewhat longer and cut to the proper length, after the jig has been assembled and the proper bit projection determined.)

11. By means of diagonals, locate the center of each end and with a 15/16" bit, bore in from each end until the holes meet, making a clear hole from end to end.

12. Cut piece of hardwood 2" wide by ½" thick to the length indicated in the drawing of jig. Draw a center line down the middle and extend it across one end. (See drawing.)

13. With glue and 6D box nails fasten the lower part of the jig just made in place as shown in the drawing.

14. Drill a small hole and countersink it, and place a ¾"-No. 5 F.H.B. screw in the position shown to serve as a center, about which to revolve the jig when boring holes in stool top.

15. Place the 15/16" bit in the hole at the top of the jig and bore clear thru the ½" piece just attached to the bottom. Cut the upright part of the jig to the length required, permitting the bit to extend the proper distance for boring the holes in the top to the depth desired. See detail.

16. Place the top in the vise and with the spoke shave finish to a true circle. Test frequently with the try square to insure keeping the edge at right angles with the face. Where grain of wood makes use of spoke shave difficult, wood rasp may be used. When brought to a true circle, bevel top and bottom edges as indicated. Finish with sandpaper. If a lathe is available the top may be finished on the face plate.

17. Set the dividers at the same radius used for laying out the screw holes in the top, and selecting a point half way between any two screws, step around the circle again dividing it into 6 equal parts.

18. From the center by means of a ruler, draw light lines to alternate ones of the points so located, choosing the one to start with that will bring the legs in the best position. Care should be taken to see that no two legs are directly opposite each other along the grain of the wood. The lines so drawn should be extended to the edge of the stool top, by means of a try square, permitting their being located when the jig is placed in position for boring.

19. Place the jig with the screw point directly in the center of the stool bottom, as indicated by the point where the dividers were used, and swing it about until its center line coincides with one of the lines radiating out from the center of the stool bottom.

20. Clamp in this position in the vise and with a ⅞" bit bore down through the hole in the jig, making a hole in the stool top for the leg. Repeat for the other two legs.

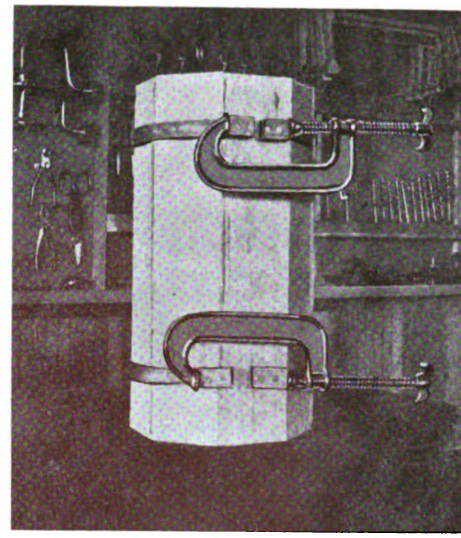
21. Make thin wedges of dry wood as shown in detail of stool top and after coating wedge, kerf, end of stool leg and inside of hole that it is to occupy with glue, drive into place. Place the wedge so that it extends across the grain of the wood in the top to avoid splitting. Note: Point of wedge only should be inserted in kerf before driving. As the leg is driven into place the wedge is forced into the kerf, expanding the end of the leg and making a very tight joint.

22. Turn stool bottom upward on bench and with stick cut 11½" long as gauge scribe around each leg and cut off with saw. If necessary dress off with wood rasp until leg sets firmly on floor.

23. Clean up thoroly with sandpaper, being careful to preserve chamfers.

24. Give priming coat of white lead, turpentine and oil with drop black added to give gray color.

25. When dry, fill defects if any, with white lead putty and apply a coat of dust gray automobile enamel, or if desired a second coat of paint may be applied and the final finish obtained by a coat of valspar or other waterproof varnish.



THE COLUMN CLAMP IN USE.

A COLUMN CLAMP.

W. W. Nolin, Manual Arts Dept., Mt. Vernon, Wash.

The illustration shows a simple column clamp, devised by the writer in the Mt. Vernon High School shop. It is made of simple materials available almost anywhere and is very satisfactory for school use. It consists simply of a strip of thin strap iron, to the ends of which blocks of hardwood have been riveted. An ordinary carriage clamp does the rest.

WOOL BALING PRESS.

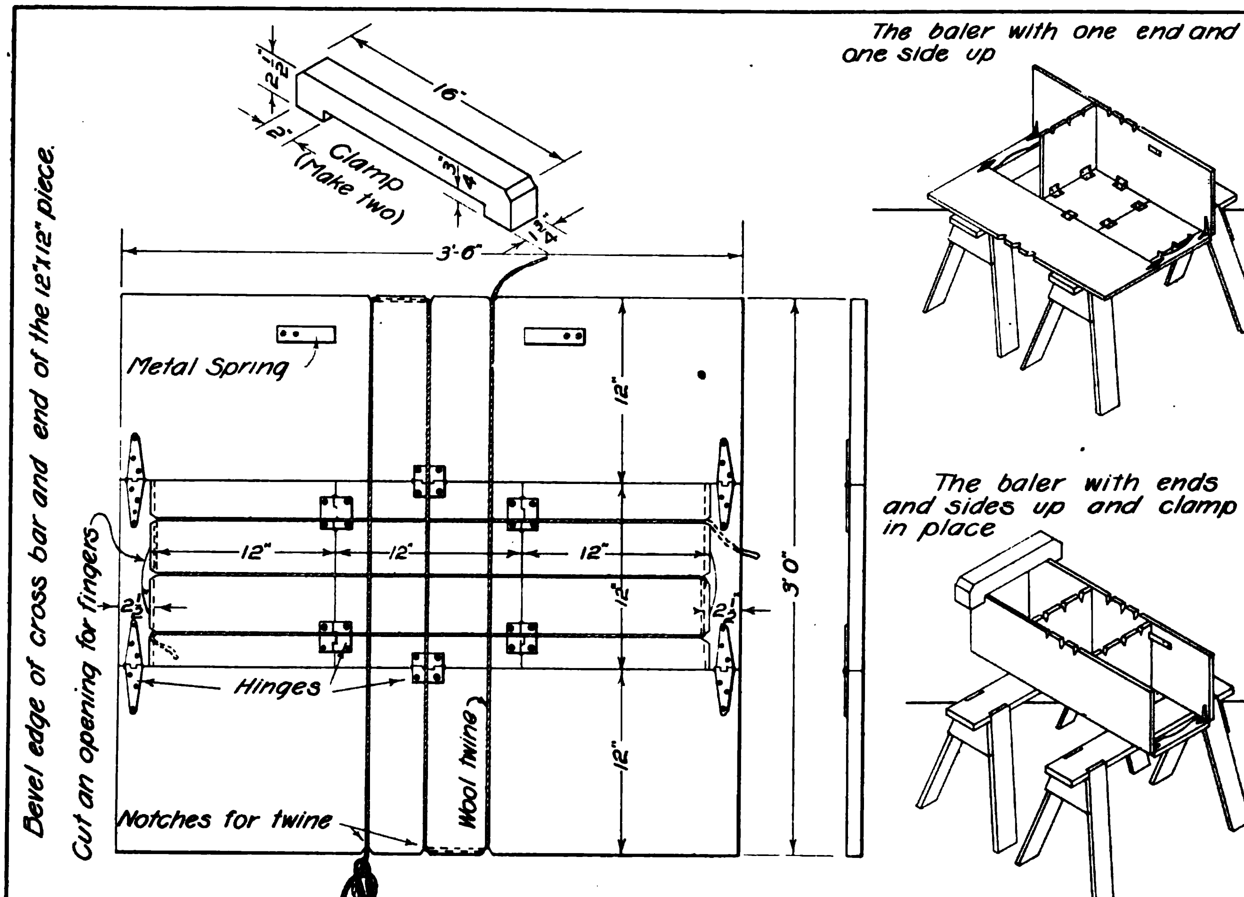
Prof. Louis M. Roehl, New York State College of Agriculture.

The wool baling press as a handy farm appliance saves enough labor and time by its use on sheep ranches and farms where wool is produced in any quantity to warrant its being made and kept on hand as part of the farm equipment.

As may be noted in the plan of the press, when it is open it is merely a platform on which the fleece is placed as on any platform or door that may be used for this purpose. By placing the twine on the platform as indicated and the fleece thrown on the twine the necessity of passing the twine around the fleece is dispensed with. As indicated in the detail drawings, the press is placed on a pair of sawhorses or other similar supports so that the manipulation of the press and the tying may be done by standing in an upright position.

The press consists of nine pieces of board as follows: 2 pieces ⅞"x12"x3'—6" for the sides; 3 pieces ⅞"x12"x12" for the ends and bottom; 2 pieces ⅞"x2½"x12" for the cross bars; 2 pieces 1¾"x2½"x16" for the clamps; 4 light strap hinges are used to fasten the sides to the cross bars at the ends and 6 2" fast joint butt hinges are used to fasten the ends and sides to the bottom. Two pieces of spring metal approximately ⅛"x1"x4" are fastened to one of the sides so as to hold the ends in place when they have been drawn up. An opening or recess is made in the side board and the metal spring pieces are placed so that their outer or screw ends are below the surface of the board and the other ends project out. Thus when the end members are drawn up the metal springs are pressed down into the recesses and spring out and hold the ends when in place.

It should be noted that the inside edges of the cross bars and the outer ends of the end pieces are beveled so that when the ends drop down flat they rest on the cross bars. It should also be noted that the inside edges of the cross bars have an opening cut so as to allow the fingers to get under the end boards when raising them.



Wool Baling Press

Notches are cut in the outside edges of the sides and outside ends of the end members to hold the twine in place.

It is desirable to measure the required length of the twine and cut as many pieces as needed. Then tie a bowline knot in one end of each piece as shown in the drawing. Then after having placed the twine and fleece on the platform and folded the press and placed the clamps in position the end of the twine need merely be slipped through the bowline knot, then drawn up tight and tied.

TENTATIVE PROGRAM OF THE NATIONAL SOCIETY FOR VOCATIONAL EDUCATION.

The National Society for Vocational Education will hold its fourteenth annual meeting February 24, 25 and 26, at Atlantic City, N. J.

At the general session, the problems of part-time and continuation-school education, industrial rehabilitation, and future activities of the association will be discussed. At an agricultural session, a variety of topics dealing with teacher training, the Smith-Lever Act, measurement of vocational practice, short courses, and a program for agricultural education will be studied.

The industrial education section will listen to talks on foreman training, up-grading of staff, private training in industry, training of women in industrial plants. The vocational home making section will take up the topics of teacher training, wage-earning employment, and development of child care.

Thursday evening, February 24th, is reserved for the section dinners to be followed by a reception at the Million Dollar Pier.

SCHOOL CRAFTS CLUB MEETING.

The round-table meeting of the School Crafts Club of New York City was held December 18th at the Ethical Culture Building. The program was divided into two sections, entitled Little Ships and Christmas Toys. At the first table, Mr. Edwin Judd, Montclair, N. J., and Mr. Thomas Darling, New York City, discussed boat making projects, while Mr. Richard A. Beyer, Hoboken, N. J., talked on boat making as a hobby.

At the second table, Mr. William B. Courtney, Hackensack, N. J., explained the making of toys and the organization of a school bazaar at which the toys will be sold.

MAINE INDUSTRIAL TRAINING SESSION.

An interesting departmental meeting of the Maine Industrial Teachers was held on October 29th, with Mr. A. B. Hayes acting as chairman. The principal speakers were Mr. Paul C. Monohan and Prof. John G. Callan of Harvard. Mr. Monohan dwelt at length on vocational education for wage-earning employment, commenting especially on the methods of the Goodrich Tire Company's School. He explained the value of vocational courses for the boy or girl who has already molded and started to shape their life career. He declared that such courses should never be offered below the junior class of the high school and pointed out that they are easily adapted to high schools. Public schools, he said, can offer better vocational courses than can be found in the industrial plants themselves.

Mr. Callan prefaced his address with an explanation of the human relations constituting part of factory management, and showed how efficient management depends wholly upon human relations between the men and the officials. Mr. Callan advanced the idea that the resources of the country are adequate to consumption and that intelligent organization of industrial effort has brought this about. The economic man, he said, is cold-blooded and heartless in his methods and plays a game against nature, but the businessman is the only practical man. Factory management, in its final analysis depends on faith in human relations.

Students Build School Building. Between two and three hundred students of the vocational department, Kansas City, Mo., are giving a practical demonstration of their ability in manual training. Under the direction of the instructor the students have begun the erection of a one-story building to be devoted to instruction in music.

MONTANA TEACHERS MEET.

There was an unusually large attendance at the annual meetings of the Montana Teachers' Association which took place in Billings, November 22nd to 24th.

A joint meeting was held with the Industrial Section at which various phases of Vocational Education were discussed. A paper on "The Present Trend in Home Economics in Our Public Schools" was given by Miss Gladys Branegan, State Director of Vocational Home Economics. Later tea was daintily served by the Home Economics pupils of the Billings High School.

At a second meeting the following program was presented:

"Recent Developments in the Teaching of Home Economics," Miss Edith Franks, State Agricultural College, Bozeman.

"A Study in Foods and Nutrition," Miss Georgia Anderson, High School, Harlowton.

"The Care and Repair of Clothing," Miss Myrtle Kuhns, County High School, Big Timber..

"The Benefits of a State Home Economics Association," Miss Blanche Lee, Acting State Leader of Home Demonstration Agents.

Following this the assembly voted to organize as a state association in view of affiliating with the national organization. The following officers were elected to promote the work during the coming year:

President, Gladys Branegan, State Supervisor of Home Economics, Bozeman.

Vice President, Olive Balcke, Fergus County High School, Lewistown.

Secretary, Inez Foster, Home Demonstration Agent, Billings.

Treasurer, Edith Franks, State College, Bozeman.

With Home Economics and Institutional Workers and home-makers as members, the Association hopes to play an active part in promoting the welfare of the homes of Montana.—Olive A. Balcke.

MICHIGAN TEACHERS MEET.

The Manual Training section of the Michigan State Teachers' Association met in St. Mark's Parish House, Grand Rapids, Mich., October 29th, 1920, at 9 a. m. Mr. F. R. Kepler of Detroit presided. In his introductory remarks, Mr. Kepler pointed out that the program was largely devoted to industrial education because that was the problem about which manual training teachers were most concerned.

Mr. E. Lewis Hayes, supervisor of vocational education in Detroit, presented a chart showing the factory organization of the modern plant. He showed the places where unskilled labor, skilled labor, apprentices and technically trained men fitted in and the opportunities for promotion for each group. Mr. Hayes also discussed the industrial information courses and industrial trade courses carried on in Detroit and the opportunities for students of these classes.

Miss Cleo Murtland, associate professor of industrial education at the University of Michigan, spoke on the need for trade courses for girls and women. In her talk she showed the justice of this demand and the great need of differentiation in their courses.

Dr. George E. Meyers, professor of industrial education at the University of Michigan, discussed the new developments thruout the state and gave a report of the numbers in Smith-Hughes classes in the several cities. He discussed the program of the continuation school made necessary by the James law which provides for part time work in school up to 18 years of age.

Dr. Meyers was followed by Dr. K. G. Smith, recently appointed supervisor of industrial education in Michigan. Dr. Smith presented a chart showing the functions of each kind of school in properly caring for the various types of students. In addition, he recommended the appointment in cities of a director of guidance and placement. He added that guidance without placement does not amount to much and that this department should have a representative in each school. Among other things, he recommended a survey of various industries.

During the business session Dr. Meyers moved that the manual training section recommend to the Michigan State Teachers' Association that a vocational education department be organized. This department would be composed of the agricultural home economics and manual training sections.

Dr. Meyers moved that the name of the section be changed from manual training section to "manual arts and vocational education section." After much discussion the motion was carried.

Mr. Percy Angove of Ionia was elected president. The meeting was attended by 150 teachers and was one of the most interesting in the history of the association.—H. N. Eddy, Secretary.

CONFERENCES ON TRADE AND INDUSTRIAL EDUCATION.

The first of a series of district conferences on trade and industrial education was held December 3rd and 4th, at Kansas City, Mo. Representatives from all states bordering on Missouri were present. Kansas was well represented by the men who plan to put the new vocational program for the state in operation the coming year.

The conference resulted in a splendid understanding of conditions, and opportunity was given for men and women in trade schools to present concrete problems for consideration by the representatives of the Federal Board.

Mr. Lyner of the Santa Fe system led one of the discussions, which was followed by a talk on apprentice schools by Mr. Thomas. Mr. C. F. Kleinfelter, in his discussion of evening school problems, placed the blame for heavy losses in attendance at these schools on the failure to arrange short unit courses of eight weeks each. Mr. Cushman seconded Mr. Kleinfelter when he declared that modern education, especially in evening schools, should be served cafeteria style in short unit courses. Mr. J. C. Wright exhibited blanks covering types of work accomplished in conducting a study in occupational analysis.

One of the interesting subjects treated was that by Mr. Lewis H. Carris, who outlined the government's plans for industrial rehabilitation. Mr. Carris brought out the fact that since all vocational education is given for the removal of a vocational handicap, it follows that this must be the basis for training men and women disabled in war or industry. Physical rehabilitation is the responsibility of society rather than of the school.

Following the banquet at the Jane Hayes-Gates Institute, the meeting was thrown open to the Vocational Teachers' Club of Kansas City and the visitors were encouraged to discuss the day's problems as they touch executive and teacher, employer and employee, teacher and pupil.—C. A. Barrett.

HOME ECONOMICS TEACHERS OF NEW YORK MEET.

The meeting of the Home Economics Section of the New York Teachers' Association was held November 22-23, at Rochester, N. Y.

At the first day's session, Mr. L. A. Wilson, Director of the Division of Vocational and Extension Education, Albany, spoke on the subject "The Problem of Vocational Training in New York State with Respect to the Work of Women and Girls." Miss Marion Van Liew and Miss Treva Kaufman, specialists in vocational education for girls, gave an outline for New York State's Plan for Home Making. At one o'clock in the afternoon, a luncheon was served for heads of home economics departments, teachers of methods and supervisors of practice, and teachers of teacher-training institutions of the state. Miss Van Liew then discussed the New York State plan for home making education, which was followed by discussions in charge of Miss Van Liew and Miss Kaufman.

At the second day's session, the general program was devoted to art, industrial arts and household arts. Miss Anna S. Richardson, of the Federal Board of Vocational Education, discussed "The Development of Home Economics under the Federal Board of Vocational Education." Miss Anna Cooley discussed "Practical Arts in the Junior High School;" Miss Agnes H. Craig talked on "Community Service and the Home Making Teacher;" Miss Treva Kaufman explained "The Home Project," and Miss Marion Van Liew discussed the work of the "State Aided Schools of Home Making."

At the business meeting the following officers were elected: President, Miss Cora Winchell, Teachers College, Columbia University; Vice-President, Miss Edith M. Barber, Home Demonstration Agent, Syracuse, N. Y.; Secretary-Treasurer, Miss Edith A. Sarver, Supervisor of Household Arts, Schenectady, N. Y.—May E. Benedict.

Now, Are There Any Questions?

This department is intended for the convenience of subscribers who may have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from persons who are competent to answer. Letters must invariably be signed with full name of inquirer. If an answer is desired by mail, a stamped envelope should be enclosed. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finishing Bronzed Articles.

146. Q:—Could you give me the following information or where I might obtain it:

I wish to finish up some hand carved picture frames using the liquid gold or bronze and tone the same afterwards. How the size is made of plaster of paris or whiting, whichever it is. The complete process in treating the frames.—C. D. G.

150. Q:—I would like a formula for making the foundation on the raised bronze lamps, book ends, similar to the Polychrome ware. Also the best process for bronzing and coloring. I have a great many very large spools I hope to use as bases for candlesticks.—R. T.

A:—Assuming that the carving is rather heavily cut and in bold relief, as is necessary for this class of work, and the frame mitered and cut preferably with a spline joint, the whole should then be given a coat of heavy glue size of such consistency that it will partly strike in and yet leave a small amount of dried, glossy material on the surfacing after hardening. Of necessity, this variance in consistency will be governed by the kind of wood of which the frames are made, in that hard wood will demand fairly thin glue, while soft wood will require much heavier. Either solution must be applied quite hot, preferably with a Fitch flowing brush. The work should be given at least forty-eight hours to dry in a warm room.

The plaster coat which may now be laid on, is made up from dental plaster to which has been added two ounces of whiting per pound of plaster. The dental plaster should be used since it has a very small coefficient of expansion while commercial plaster paris has a very marked tendency to shrink. This should be mixed thoroly in a tin cup with enough water to form a body as thick as varnish and should be applied with a soft bodied brush as in the case of the glue size. It will take some practice and experience to learn to handle this material properly, as it is a part of one of the most exacting phases of the gilder's trade.

Avoid mixing any great amount of this putty-coat as it hardens very soon and so must be worked up quite rapidly. The greatest difficulty to be encountered is for the beginner to learn to handle the material in successive patches without contaminating the new batch with small particles of older, hardened plaster. For this reason it is best to keep two cups in use and when one batch is used up, the second may be soaking in a pail of warm water and then be readily cleaned with a stiff brush. This putty or plaster coat should be built up until at least one-sixteenth of an inch of plaster covers the work. All veining and other lines may be pointed up with a tool dipped in water, altho it is preferable that these lines be not too strongly accented, otherwise the softening effect of the plaster will be lost.

The completed frame should be allowed to dry in a warm room to season for at least a week. Any small checks or cracks which develop may then be pointed up and allowed to dry and harden thoroly. At this point all other work should be gone over with a 0000 split polishing paper. Following the sandpaper the work should be given a coat of pale japan gold size, preferably Pratt & Lambert's, slightly reduced with enough turpentine to allow to brush on freely. It may be necessary to repeat this coat in order to thoroly fill up the plaster coat and stop all suction. As soon as the last coat has begun to get the least bit tacky, put the bronze powder in a small bag of cheesecloth to form a pounce about an inch in diameter. By holding this over the work and tapping it lightly against the thumb nail, the japan will absorb sufficient bronze to give a good foundation. When this has hardened up, the extra bronze may be removed by holding the frame upside down over a piece of clean paper, and rapping the back of the frame.

If it is desired to burnish any of the high lights, this should be done by sizing the parts with a little of the japan and when tacky laying on a little gold leaf and gently pouncing it into place with a small pad of cotton. When hard it may be burnished with an agate burnisher or if this is not obtainable, the hard bone handle of an old toothbrush may be used instead. After the frame is completely burnished and gilded, it should be given a coat of bronzing liquid or a thin coat of starch solution in case a dull effect is desired. The starch solution is made by rubbing up a small amount of laundry starch in cold water and then adding enough boiling water to make a clear and not too thin solution of cooked starch. This may be brushed on the work and when dry will become perfectly flat without any gloss. In order to brighten the work at any time, this starch coat may be removed by washing with a soft sponge and warm water, thereby removing the dirt and stains as well. Recoating with the starch solution should bring the work back to its original brightness.

Where spools or book ends are to be used for wooden bases of polychrome ware, they should be turned or shaped an eighth of an inch smaller than the desired finished dimensions. In the case of carving on a candlestick and where it is desired to repeat the design in a large number of pieces, it is best to turn and carve one candlestick to accurate size, and detail and finish, with several coats of varnish while still in the lathe.

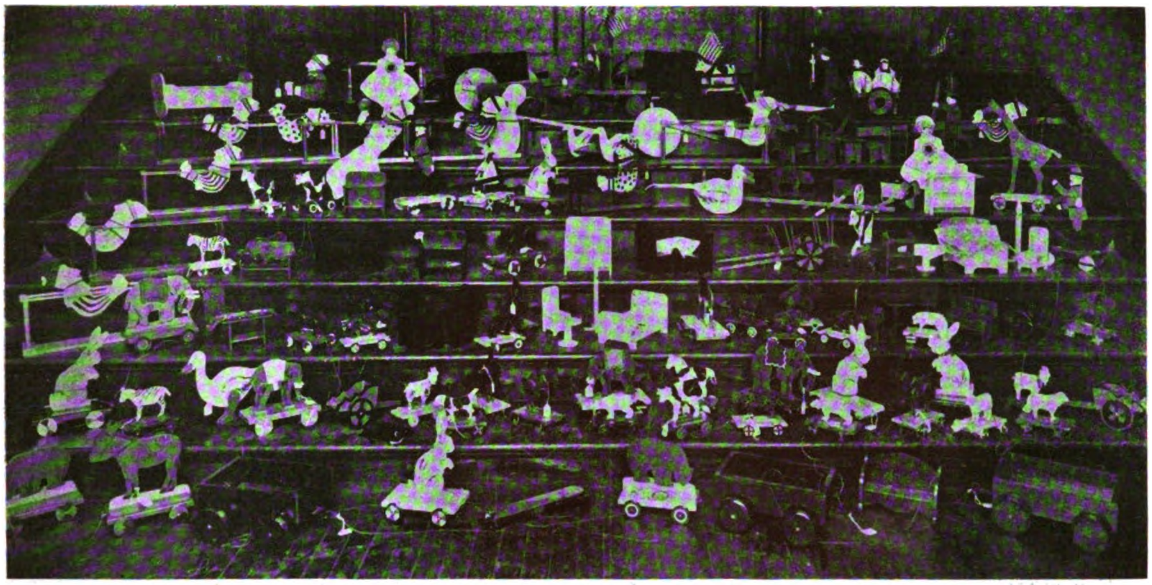
After this varnish coat is dry and hard, the candlestick should be used as a pattern in making a half split plaster paris mould. As soon as the plaster is hardened it should be opened up, the pattern taken out and any injured portions pointed up and repaired. It should then be allowed to dry in a warm room until entirely free from moisture. By warming it slightly, melted paraffine may then be brushed on until the whole surface is coated clean and all portions satisfied with paraffine, so that the mould will not again absorb water in subsequent use. When a mould has cooled and the paraffine hardened, it may then be polished with a stiff rubbing brush so as to leave a very smooth and hard, bright surface ready for use. The two halves of the mould should be carefully centered and locked and the core carefully centered. The putty coat may be then run in by mixing it thin as for the brushing work but should not be disturbed for at least four hours after pouring. The mould may then be opened and the cast pattern set aside to harden. At this point the sandpapering and pointing up may proceed as for the picture frame work.

Owing to the large number of different colored bronzes which are available on the market, many different blends of colors and varied effects may be obtained. The back files of the Industrial-Arts Magazine for the current year contain several articles, chief among which is that one on the sub'ect of "Bronzes and Their Use." This will afford considerable information as to the method of using different glazes for shading at the base of relief carvings.—R. G. Waring.

Books on Basketry.

148. Q:—As a salesman in the Basket section of the Philadelphia Wanamaker store, I am asking you for a short bibliography on the Materials of Basketry. I wish this not for the hand making of baskets, but to identify and understand the various materials. Can you suggest a few magazine articles of value for my purpose?—C. H. C.

A:—Following is a list of books on basket materials: Pine Needle Basketry in Schools, Wm. C. A. Hammel, Bulletin 1917, No. 3, U. S. Bureau of Education; Illustrated History of Indian Baskets and Plates, T. A. Roseberry, 1260 California St., San Francisco, Calif; Pine Cones and Needles, E. F. Davis, East Machias, Washington County, Me.; Basket Willow Culture in New York State, J. W. Stephen, State College of Forestry, Syracuse, N. Y.; Basket Willows, W. F. Hubbard (Rev. Ed. 1909), Superintendent of Documents, Government Printing Office, Washington, D. C.; Willows: Their Growth, Use and Importance, G. W. Lamb, Superintendent of Documents, Government Printing Office, Washington, D. C.; Useful Fibres of the World (Juncus Effusus), Dodge; Fibres and Fibre Cultivation, C. F. Wicker, Pan-American Magazine, M. 30; 13-24 N. 1919; Brazilian Fibres, J. E. Agan, Bul. Pan-American Union, 50; 394-404 April 1920; Basket Willow Culture, G. W. Lamb, Farmers' Bulletin, 622; 1-34, 1914; Use for Pine Needles, Sci. Am. 119; 440 N. 30, 1918; Wire Grass Basketry, C. B. Whitehouse, Art World 2; 485-7, Aug. 1917; Palm and Pine, Country Life, 35; 39 March 1919.



TOYS MADE AT ROCHESTER, N. Y. Mr. Raymond C. Keople, Supervisor of Industrial Education.

Heat Treatment.

152. Q:—We are discusisng in our machine work the subject of the treatment of iron and steel. I would like a book that explains thoroly the subjects of "Annealing," "Tempering," and other heat treatments of iron and steel. I find very few discuss these subjects, but rather the handling of metals. I would not want a very expensive treatise.—G. A. T.

A:—Press Working of Metals, Oberlin Smith, John Wiley & Sons, New York; Metal Working, Paul Hasluck, Funk & Wagnalls Co., New York; Metal Work, Adam & Evans, Longmans, Green & Co., New York; Principles of Setting Out, Alfred Parr, Longmans, Green & Co., New York; Steel, E. R. Markham, $2.50, N. W. Henley Pub. Co., New York; Hardening, Tempering, Analyzing & Forging of Steel, J. V. Woodworth, $2.50, N. W. Henley Pub. Co., New York.

Forge Troubles.

153. Q:—We have two forges installed in our manual training shop which we haven't been able to use due to the lack of a proper draft. Both forges enter their smoke pipes into a chimney, which isn't used for any other purpose. Can you suggest any means by which this difficulty can be overcome? We desire some simple scheme which wouldn't cost a great deal.—A. G. W.

A:—Perhaps one reason that the forges do not draw the smoke into the chimney is because the chimney is not high enough over roof of the shop. I would suggest that a sheet iron pipe extension be placed on the top of the chimney, making it higher. One forge to a flue is enough to get good results. The pipe from forges entering the flue should be at least a foot or more higher thru the elbow. A blast of air from the fan into the pipes would carry smoke out. Any forge, no matter how it is constructed, handled by an inexperienced worker, is liable to smoke when the fire is being built. If one piles on the fire a lot of green coal, without an airhole at the top, it will smoke more or less for a while, until the coal is well coked.

I would suggest that after the green coal is placed onto the fires in these forges, they should be well loosened up at the top with a poker, then allow the fire to burn for a little while without using blast. This has a tendency to dry out the coal and burning the smoke. Also place the green coal on the sides and back of fire when rebuilding it, leaving the center open.—Thomas F. Googerty.

MONTANA INDUSTRIAL TEACHERS MEET.

The Montana Industrial Teachers held their meeting on November 22nd, in connection with the State Teachers' Association. The work taken up consisted of the vocational aspects of industrial education. Mr. A. T. Peterson acted as chairman of the meeting.

At the meeting, one section was devoted to home economics, agriculture, and trade and industrial work. The speakers were Miss Gladys Branegan, State Director of Vocational Home Economics, H. A. Tieman, Regional Director for Montana; M. J. Abbey, State Director of Agricultural Education, and G. B. Edwards. Round-table discussions followed the set program which was attended by a large number of teachers.

At the meeting of trade, industrial and agricultural teachers, state directors took part, while Supt. Maddock of Butte, talked on "Part-Time and Evening Schools." Supt. Logan had a strong paper on "Services of Schools in Agriculture." State Directors Abbey and Edwards added materially to the success of the program, the former discussing the subject "Effective Agricultural Instruction" and the latter talking on the subject of "Rehabilitation."

The officers chosen for the next year were Mr. A. T. Peterson, Miles City, President, and Mr. C. W. Gray, Lewistown, Secretary.—A. T. Peterson.

NEWS AND NOTES

Soldier Students Sell Jewelry. An exhibit of jewelry made by war veterans was recently held at Memorial Hall, Providence, R. I., to which the public was invited. Bracelets, brooches, necklaces and rings made up the display of work of 160 soldier craftsmen attending the classes at the School of Design. The proceeds of the sale go to the men who make the articles.

Show Card Class Has Record Enrollment. The show card class opened at the high school, Lawrence, Mass., enrolled the maximum number of students, with a waiting list. It is planned to open a second class and to follow the present course with a more advanced one in commercial and magazine illustrating.

Boys Make Useful Things. The students in the continuation school at Springfield, Mass., have made a number of useful things. In the wood working department, such articles as clothes racks, ladders, typewriter tables and book racks have been made. The boys in the machine shop have turned out reamers and mandrels, those in the sheet metal department have made match boxes, blotter holders, and dust pans, while the boys in the printing department have printed a great deal of material for the use of the schools. The boys have printed more than fifty songs to be used in the assembly periods.

Exhibit of Drawings. A window display of drawings made by high school students at Bangor, Me., was recently held. The display included commercial illustration advertisements, window cards, posters, original designs in batik, covers for folders and sporting booklets, boxes, pencil, charcoal and pen-and-ink work.

The Danger in Vocational Education. Dr. Frank P. Graves, Dean of the School of Education, University of Pennsylvania, discussing the vocational education move-

ment before the Central Ohio Teachers' Association recently, declared that there is a big danger in vocational education as it has been used in the schools. Vocational education has been developed, but while it marks a great advance, it also involves a danger. He declared the schools have been rushing in headlong to supply it, without due regard to the ways and means. We are still in bondage to the past, he said, where manual labor was menial, to be performed only by serfs. We can dignify labor by giving an important place in the curriculum to industrial pursuits and causing pupils to realize it is just as important as professional work.

Holyoke Opens Continuation School. A continuation school has been opened under the direct supervision of the school board. There will be a faculty of nine teachers, with two academic and two nonacademic teachers for boys' classes, and two academic women teachers and two nonacademic teachers. The course will include English, arithmetic, civics, hygiene, typewriting and bookkeeping and filing.

Want Technical High School. The faculty of the Manual Training High School at Peoria, Ill., has asked that the school be reorganized into a technical school similar to the Lane School in Chicago. It is planned to erect a new building and to use the present structure for a continuation school.

To Fit Industrial Cripples for Trades. Governor Smith of New York State has been given the program under which the state plans to return to useful lives, such persons as have been permanently injured in the industries. The plan calls for close cooperation between the state education department and the industrial commission. The sum of $75,000 has been appropriated by the state and the federal government will provide an additional $75,000.

Stands High in Vocational Education. Idaho, altho one of the smallest states in the union in point of population, has attained a leading place among the western states in the amount and quality of vocational work, according to the director of vocational education. There are thirty high schools conducting Smith-Hughes work, with twenty already designated and thirty more applying for recognition as Smith-Hughes schools in vocational economics. More than thirty trade schools and classes will be conducted this year according to estimates of the director. The superintendents of the state are interested and are anxious to introduce agriculture and economics courses, and to connect the schools with the industrial work of the communities.

Addition to Education Department. A new division of the New York Education Department has been created with the title of vocational and extension department. The division which is in charge of Mr. Louis A. Wolson, will have the powers and exercise the functions of the division of agricultural and industrial education, and will have general supervision of the work of the department relating to extension education—including the development of special extension courses thru cooperation with universities, colleges and institutions of less than college grade—the organization and supervision of evening schools, home classes, factory classes and afternoon classes; Americanization work and educational work among foreign and native-born illiterates and other extension activities. The division will also have charge of the rehabilitation activities provided for under the state and federal acts, including the advisement, training, placement and followup work of disabled persons who apply for vocational retraining.

Founds Vocational School. Thru the will of Harriet B. Clough, of Gloucester, Mass., $10,000 is left to the city, the money to be held in trust until it accumulates to $100,000, when the income is to be used for the establishment of a vocational school.

High School Girls Make Baking Record. Eight girls of the Vocational High School, Minneapolis, Minn., recently established a record when they baked ten pies, eleven cakes and 151 doughnuts in two hours and a half. In the sewing department, one student in five weeks' time completed six kitchen aprons, two coverall aprons, two nightgowns, one middy, three guimpes, four rompers and one dress.

Evening Industrial School Opened. The evening school at Beverly, Mass., opened for the season with classes for women in sewing, millinery, home care of the sick, and reading of blue prints. For men there will be instruction in drafting, tool making, machine shop practice, electricity, pattern making, plumbing, carpentry and stationary engineering. The school is open to any resident of the state who is over 16 years of age.

PERSONAL NEWS.

Mr. E. A. Wreidt, formerly supervisor of industrial education for Illinois, has been appointed State Director of Vocational Education of Indiana. Mr. Wreidt succeeds J. C. Collicott, who resigned.

Mr. Geo. I. Stevens of Billings, Mont., has been appointed to the state office of the Federal Board at Helena. Mr. Stevens will be the field agent and will work under Mr. Lief Fredericks.

Mr. Charles E. Thomas has been made instructor in automobile mechanics at the East High School, Erie, Pa. More than sixty prospective students enrolled for the first year's work this fall.

Mr. D. B. Peterson has been appointed instructor in wood working at the East High School, Erie, Pa. Mr. Peterson has the necessary teaching qualifications, combined with an experience of twenty years as a practical carpenter.

Mr. J. F. Jeffery has been made instructor in drafting at the Gridley Junior High School, Erie, Pa.

Mr. A. G. Norris, Supervisor of Trades and Industries of the Missouri Board of Vocational Education, is acting as temporary principal of the Lathrop Trade School, at Kansas City, since the departure of Mr. Cushman.

The Lathrop Trade School, Kansas City, Mo., has secured as head of the printing department, Mr. F. C. Clippinger, who succeeds Mr. Bush. Mr. Clippinger learned his trade in a "country shop," and was for some time head of the linotype department of the Kansas City Star.

H. G. Martin, director of the Isaac Delgado Central Trades School of New Orleans has undertaken to teach a blind man to become an instructor in trade school work. Thomas Slough, who some years ago was a skilled mechanic in machine shop work and electrical construction lost his sight entirely by an accident in the shop. For many years he was in no position to earn his living until the Louisiana Commission for the Blind opened a broom making shop where Mr. Slough found employment.

Director Martin having observed that Mr. Slough possessed both skill and ambition suggested that he learn to be a teacher. The broom maker grasped the opportunity and has attended the lectures of Director Martin in the temporary quarters of the Delgado school. Mr. Martin has notes prepared of his lectures and these are translated into the Braille writing system for the blind.

Mr. Robert M. Smith, formerly supervisor of manual training in the Chicago schools, has accepted a position in the high school at Americus, Ga.

PAPER CUTTING BY A 12-YEAR AUSTRIAN BOY, VIENNA INDUSTRIAL ART INSTITUTE.

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The INDUSTRIAL-ARTS MAGAZINE

·MARCH·1921·

THE-BRUCE PUBLISHING-COMPANY

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INDUSTRIAL-ARTS MAGAZINE

Volume X MARCH, 1921 Number 3

Productive Work in the Manual Training Shop

R. L. F. Biesemeier, New Trier Township High School, Kenilworth, Ill.

MANUAL training departments are doing productive work when the students are so organized as to produce a number of similar projects that have a marketable value, as desks, chairs, benches, tables, etc. A manual training department doing productive work in its shops, and having the students organized for producing a number of projects by use of jigs, fixtures and other means of duplication, may be considered similar to a factory producing furniture, machinery, etc., with the exception that in the former case, education of the student is the major part of the product, while that of the factory is production only.

Before the great war, and well up in the year 1916, there was much talk and considerable experimental activity relative to industrializing and vocationalizing education, this being especially true of the useful and practical arts. The leaders in commercial industry and progressives were influenced by economic conditions and made the educators feel the pressure of their demands. The widespread public sentiment, demanding the vitalizing of manual arts by vocationalizing it, could not be denied. In all probability at the present time, if not for the war, many cities would have the manual training work so vitalized that productive work on an industrial or factory basis would be a reality.

Dr. Charles W. Eliot, president emeritus of Harvard University, has said that "industrial education ought to mean trade schools, and nothing but trade schools." This statement must be recognized as extreme and dogmatic. It will not stand the acid test of thinking educators. In fact, schoolmen differ as radically as do the representatives of capital and labor regarding the place of industrial education in the general plan.

We have it on good authority, from those in the industrial and commercial world to whom the educator must go if he wants a measure of the practical value of any course of study formulated by himself that those responsible for our modern curriculum do not realize that there is a wide and deep chasm between the school and the vocation of the individual. Really practical and useful information is not taught. That the work is too theoretical and smacks of too strict an adherence to book lore, is the claim of those who look upon the school work from the outside.

Educators are too often far removed from the common herd to have cognizance of its needs, not associating themselves enough with those engaged in commercial and technical pursuits. One is sometimes led to believe that the educator has been blind to the people's needs and remiss in his high duty; that he has opposed where he should have helped, and followed where he should have led. Undoubtedly the greatest obstacle to the industrialization of vocational education has been the attitude of the conservative educator, which has varied from open hostility to entire indifference.

Justification of Production Work.

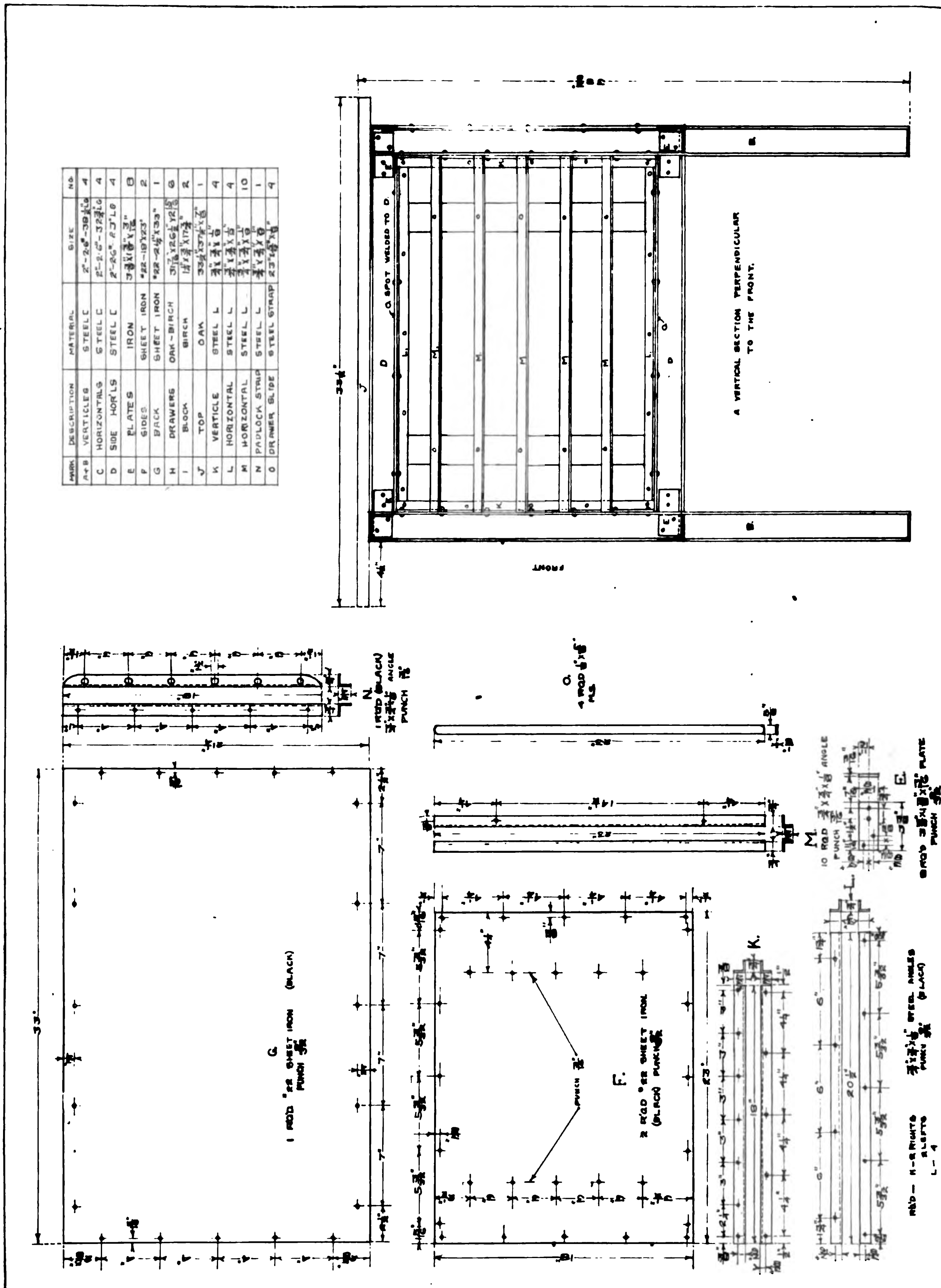
From the first conception of manual training work in the secondary schools and colleges, the idea of productive work was the dominating one. This is evidenced by a number of instances among educational institutions who first installed equipment for manual training work. The equipment was purchased and installed with the view of doing contract productive work. These institutions found that productive work on a commercial basis or scale, for economic gain only, was not profitable or practical when education of the students was given the attention necessary for the best results. Because industry is concerned primarily with material production, while education is concerned primarily with the unfolding of human powers, commercial shop methods should be used for a different purpose than economic gain. Educational value must be the first consideration, and the money value of the productive work must be second.

In many schools a considerable amount of productive work could be carried on in the shops with a good financial return and with as great an educational value as under the individual piece plan.

The justification of productive work in the manual training shop may be divided into two divisions or headings for analysis, namely, educational advantages and material or financial advantages.

The Educational Advantages.

(a) Many of the essentials of an organization, as used in commercial industries, may be brought out in productive work, if handled properly, such as administration, engineering work, cost accounting, management of shop personnel, etc. Opportunity is afforded to study



MARK	DESCRIPTION	MATERIAL	SIZE	NO.
A+B	VERTICLES	STEEL C	2"-2.6#-39 1/8" LG	4
C	HORIZONTALS	STEEL C	2"-2.6#-32 3/4" LG	4
D	SIDE HOR'LS	STEEL C	2"-2.6#-23" LG	4
E	PLATES	IRON	3 3/4" X 1 3/8" X 3/16"	8
F	SIDES	SHEET IRON	#22-19"X23"	2
G	BACK	SHEET IRON	#22-24 1/2"X33"	1
H	DRAWERS	OAK-BIRCH	3 7/16" X 26 1/2" X 2 15/16"	6
I	BLOCK	BIRCH	1 1/2" X 3/4" X 17 3/4"	2
J	TOP	OAK	33 1/2" X 37 1/2" X 7/8"	1
K	VERTICLE	STEEL L	3/4" X 3/4" X 1/8"	4
L	HORIZONTAL	STEEL L	3/4" X 3/4" X 1/8"	4
M	HORIZONTAL	STEEL L	3/4" X 3/4" X 1/8"	10
N	PADLOCK STRIP	STEEL L	3/4" X 3/4" X 1/8"	1
O	DRAWER SLIDE	STEEL STRAP	23" X 1 1/2" X 1/8"	4

DETAILS OF DRAWING TABLE.

processes, capacity of machines and operation, routing of material thru shop. The development of foremen, inspectors, mechanics and engineers may be studied.

(b) Self-analysis may be brought out by the use of motion or time study for maximum production, which is not only of educational value but of commercial as well.

(c) A competitive class spirit can be brought

about by proper division of the pupils into groups. In an effort to be the leading producing group, considerable thought and unconscious effort will be given to the matter of handling material for maximum production.

(d) Under the productive method of grouping students, many large projects of greater interest to student and teacher as well as projects of greater educational and intrinsic value can be made and a desirable shop atmosphere may be created in this way.

(e) Teachers are kept alive with interest because they must be continuously seeking desirable projects, disposing of finished work, working out processes and perfecting methods as well as selecting a working organization of the students.

(f) It makes possible the correlation of the shops, and mechanical drawing departments to a very remarkable extent.

(g) There is a greater interest in the manual training work by the taxpayers of the community, and makes inapplicable the criticism that our schools do not train for reasonable efficiency in the useful arts of life.

Material and Financial Justification.

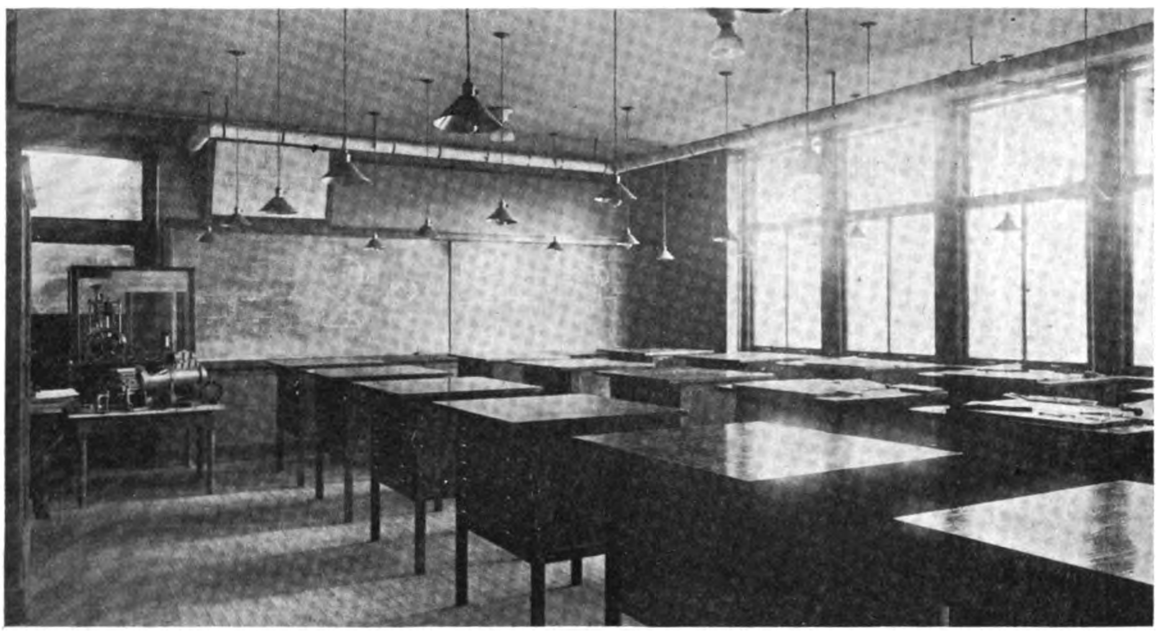
The material advantages of productive work in the shops may be found in the ability of the shops to make needed equipment such as desks, chairs, tables, playground apparatus, bleachers, etc., at times when funds are not available for buying ready-made equipment on the market.

Frequently special equipment is desired and cannot be obtained in the open market. It is here that a good productive shop organization may come in to good advantage.

There is a very small percentage of loss in raw material or stock due to error, and scrap due to cutting. The large financial outlay for an up-to-date manual training equipment makes necessary, from the business standpoint as well as that of the school administration, that some kind of productive work be done so that a portion of the expense of maintaining the department can be carried by the work done in the shops.

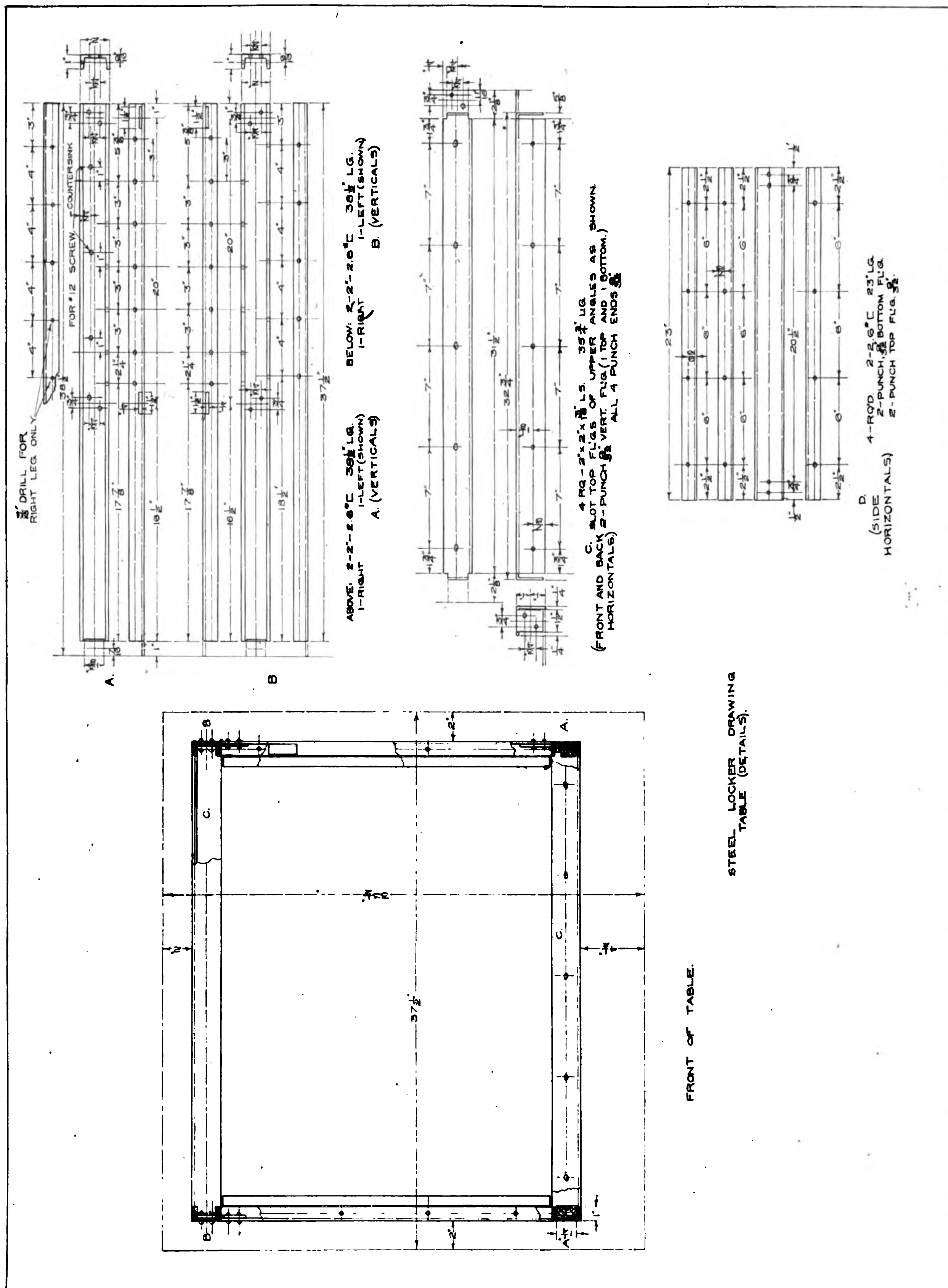
Method of Handling Class and Work.

In discussing methods of handling classes doing productive work, I am undoubtedly treading on dangerous ground, because there will be as many different ideas about doing productive work as there are teachers, and all will get results in a greater or lesser degree. Many times the personal equation of the students in the class make necessary a different method of handling. However, I have found the following method to be suitable for most cases. The method of study should be one of participation, that is, it should consist of actual shop experience in producing some article as contrasted with mere information seeking. Only in this way can the school workshop be made an aid in interpreting the industrial world.



DRAWING ROOM IN THE NEW TRIER TOWNSHIP HIGH SCHOOL, EQUIPPED WITH TABLES MADE BY STUDENTS.

The first few days the class is assembled and a series of lectures and demonstrations are given covering the necessary fundamentals, material, processes, tools and machines. Then a series of simple individual projects is worked out by each student, embodying these fundamental operations. This work requires three to four weeks. During this period the teacher can make a careful study of the personal equation of the class and the selection of an organization for the various groups which are to do productive work. Selecting the first group from those best qualified enables the instructor to get the productive work under way with the least possible delay and interruption. It is at this point in the work that the teacher must give practically all of his attention because this first group must be thoroly instructed as to every detail so they may assist in supervising the following groups.



DETAILS OF DRAWING TABLE.

Progressive Organization.

The work is handled by progressive group organizations, that is, each student of the first productive group, when proficient, is given an understudy to whom he must teach all he knows about operating the machine or the hand processes that he is performing.

The first group is then acting as foremen or teachers during the time the second group is learning. The

instructors check up on both groups. When the understudy can be trusted to handle his part of the work without supervision, members of the first group are started on new projects or operations. The second group breaks in the third group; the third group breaks in the fourth group, and so on.

Progressive Projects.

The system should include progressive projects for productive work. That is, the operations on a project as well as various projects for productive work should be made progressive from the standpoint of skill required, interest to student and educational value.

Progressive project work should tie together all the manual training shops and link them with the mechanical drawing department. Types of projects which involve pattern making, foundry work, forging and machine work are the best types of progressive project, because they are in a true sense progressive from the standpoint of physical and mental development of the student, degree of skill required, educational and commercial value as well as being in the same sequential order of progress thru the shop as the student.

Projects requiring the use of jigs, fixtures and other means of duplication to secure interchangeability, as well as to eliminate the possibility of error, are very desirable because it is possible to teach the fundamental tool process to students of poor caliber in a productive way while the project may be going thru the shops in a truly progressive manner.

Under this progressive method of productive work every student has an opportunity to advance to the utmost limit of his ability, because it is possible to keep in progress of construction projects which will require the greatest skill and intelligence as well as some simple enough for those less qualified. Care should be exercised in selecting salable or unsalable projects as this will add much to the reality of the problem.

Disadvantages of Productive Work.

The advantages of productive work, if carried out in the manner as outlined, are so great as compared with the disadvantages that they could be neglected. However, there are some apparent disadvantages which can be classified as educational, personal and financial.

It is not infrequent that we find a certain definite production has been planned and generally this is a rather ambitious undertaking which makes necessary the working of students on a certain piece of work or operation longer than its educational value would warrant. Thus production is given special attention and emphasis at the expense of the educational value.

Personal and Financial Shortcomings.

Under this heading the teacher of manual training as well as those responsible for planning the shop work for the students are to be considered. It is evident to all that if high-grade productive work is to be done in the shops the teachers must be very able. That is, their academic training, trade experience, teaching and organizing ability must be the best. Men who have the necessary qualifications cannot be found in large numbers at the salary available for such purposes. The United States Shipping Board found on investigation that out of 1,098 men instructing workers in the ship yards, the average trade experience was over ten years. If we do or do not agree on the necessity of such training from the pedagogical viewpoint, we must accept the fact that these teachers were very successful in getting results, producing over half a million dead weight tons. However, it is quite difficult to get a teacher with ten years' trade experience who has had sufficient academic training.

When many small projects are produced or a few large ones are made, the material involved may cost considerably. Thus if it is planned to build 25 ready-cut garages, or 25 gasoline engines or 25 oak drawing tables, the question of financing the work might be a serious problem, unless the board of education had the utmost confidence in the manual training department.

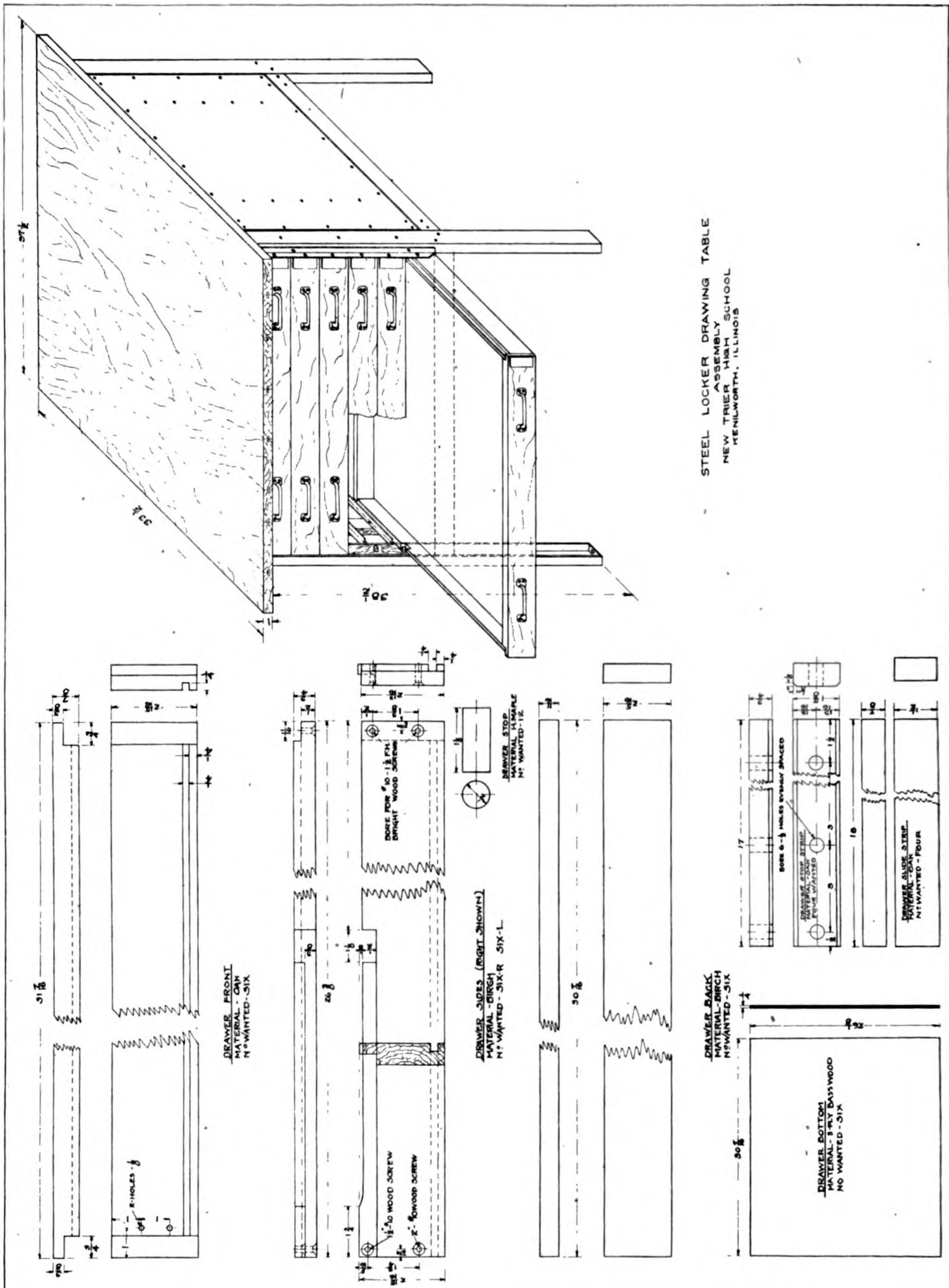
Good equipment is essential for profitable productive work and equipment costs considerable money these days. Therefore, the lack of funds may be a serious handicap to successful productive work.

Production by Beginners.

It has been generally conceded that productive work in advanced classes is a highly desirable thing to do, "that is, after they have developed both the skill-of-hand and skill-of-mind points of view. The educational benefits of such methods begin when those of good individual hand work end, and the factory or productive shop method should be supplementary to the school method and preferably sequential with it and following it." Undoubtedly the more skilful the student in hand and mind, the more successful the productive work would be. However, this seems to be begging the question and following the lines of least resistance, because a number of individual projects were given the student to spoil so that he could develop skill of hand and mind before undertaking productive work. That is, the experimentation was done with individual projects.

The use of jigs, forms and the like to get speed of output is not the essential reason for using such devices in doing productive work in the school shop. Their use enables productive work to be carried on during the early learning period which gives the student a chance to get a good idea of machine operation, the fundamental tool processes, and some knowledge of materials in a shorter period of time than would be possible by any other method. Learning to operate an up-to-date machine tool is quite an education in itself. It enables the operator to become familiar with the construction and design of a tool which represents an evolution and development in machine-tool construction, being the product of the best engineering minds in the country.

It is entirely possible to select projects to build on a productive basis, which have many simple operations, such as cutting stock to length, drilling holes, surfacing, etc., that the beginner can do by use of proper fixtures.



DETAILS OF DRAWING TABLE.

While the operation of the machines is not at all difficult, the opportunity for getting first-hand information on cutting edge tools and their proper uses are unexcelled. Then there is a sense of responsibility, "a shop atmosphere," that is responsible for the students' increased interest and effort which are very essential to the beginner. The proper use of progressive organization and the progressive project will permit of the intro-

duction of productive work as the very first work done by the students.

Example of Productive Work.

The steel locker drawing table is a good example of progressive project suitable for productive work in the school shop and is in use by the New Trier Township High School. The design was worked out after having carefully considered the following conditions: A desirable substantial locker drawer table was needed by the mechanical drawing department, that the tables were to be made by the students in shop work, and that wood and steel should be used in the construction so as to distribute the burden of production over several different shops. It was desired to make the project progressive from the standpoint of the movement of the work and student thru the wood and metal shops. The design must be such that by the use of the proper jigs and fixtures the students could get their very first shop experience by doing actual productive work. It is very desirable to acquaint the student; first, with the material to be worked; second, machines that will be used; and third, the various fundamentals of the work. With this order of procedure in mind, the student must first acquaint himself with the rough raw material as it is found on the market and received from the sawmill or rolling mill. That is, the lumber must be selected so that in the rough sawing the bad portion may be culled out. In getting out the rough stock gives the student an excellent opportunity to learn something of the physical properties of wood and iron and how cutting-edge tools such as the saw, planer, drill press, shear, etc., operate. Thus the student has a chance to do actual productive work in rough sawing, etc., while he is learning some of the fundamentals of doing work. The theory and practice of rip and cross sawing, etc., is taught by the applicatory method, that is, actually doing practical sawing jobs. As the material advances thru the shop and goes from one operation to another and so on to completion, the machine and hand operations require greater care and skill on the part of the student. But he has gained information and acquired considerable skill by advancing with the project. It is very true that this is possible only by careful planning of the work and the use of jigs, fixtures and various methods to prevent error.

ORIENTAL INFLUENCE IN PRINTED TEXTILES

Jean Paul Slusser, New York, N. Y.

HOW many of our young textile designers realize that tho our traditions in printed textiles come to us directly from England and France, practically all of them originated in the Orient, and that at no very ancient date? A study of some of the sources from which the Western textile industry borrowed its original ideas, most of its earlier patterns, should be of real value to the designer who is seriously interested in mastering the secrets of beauty and effectiveness in his art.

Altho it is well known that the painting of cotton cloth with mordants and dyes was practiced in Egypt in the first century A. D., and textile printing from wood blocks was practiced in medieval Germany, our modern tradition in printed cloth originated during the seventeenth century from strictly oriental sources. From time immemorial the decoration of material with painted designs, and to some extent with block printed ones, had been carried on in Persia and India. Early in the seventeenth century these Indian cloths, at that time called "chints," later "chintzes," from a Hindu word derived from the Sanscrit "chitra," meaning "many-colored," "spotted," were being imported in large quantities into both England and France. So popular did they become in England that by 1676 a factory had been founded near London for the manufacture of printed textiles in imitation of the oriental ones, and in 1700 an act was passed by Parliament to protect the infant industry by forbidding the use and wear of all wrought silks, mixed stuffs and figured calicoes imported from Persia, China or the East Indies. This, however, did not prevent the continued smuggling and use of the treasured Indian chintzes.

A German cotton print, 18th century, in imitation of an Oriental pattern. In this can be seen the beginnings of the traditional European style in flowered cotton textiles.

Hand painted cotton, 17th century, from Amber, India. An admirably simple and logical piece of flower decoration, in which, in spite of conventionalization, the character of the plant is not sacrificed. Notice the fine spacing of the blossoms and the happy filling of the spaces between the stems with other forms.
Thru the courtesy of the Brooklyn Museum.

These Indian and Persian textiles consisted largely of bed-spreads, curtains, scarfs and handkerchiefs, and were all loosely called "palampores," literally "bed-covers." They were very largely painted by hand, or decorated by a combined process of painting and wood-block printing. When painted, the large outlines of the design were as a rule stamped on the goods, by the method of rubbing a perforated pattern with charcoal dust, the painter later working over it with fine brushes. Various processes involving the use of mordants, wax-resist, dyeing as in batik, etc., were used. The colors, three or four in number, were finally so thoroly fixed in the material that repeated boiling only intensified them. Details and repeat motives were often printed from wood blocks cut in relief, very much in the manner practiced today by western textile manufacturers, and in some localities the entire design was block-printed.

The English and French imitations of these oriental textiles were, needless to say, done by machinery rather than by hand; decorating chintzes, by stamping designs from wood blocks or copper plates, was at first widely followed. Parts at first were even tinted by hand, and to a certain extent, the hand block-printing of textiles has been followed ever since in England and France and even in America. But after the invention in 1785 by one Bell, a Scotchman, of copper roller printing, the bulk of textile decoration was done by machinery, and there set in that general mechanizing and debasing of style which is apparently the inevitable accompaniment of machine processes, and which to many critical observers has seemed to spell the death of art.

It was nearly a century later that William Morris, in England, made his famous stand against this kind of machine-made ugliness, and so beautiful were many of his designs that many of them are in use to this day, and his work practically constitutes a distinct style. His designs were based partly upon a study of the best medieval European types of ornament, and partly upon a fresh observation of nature herself. Tho Morris, like all true artists, made a gospel of beautiful workmanship and gave first place to the hand-made in everything, he recognized the necessities and demands of modern life

Hand-painted palampore from India. Tree of Life design. In spite of the elaborateness of the flowers, they are always clear and logical in outline. Observe how the all-over quality of the design is maintained thru recurring different spots.
From the Metropolitan Museum of Art.

A set of Persian tiles dating from the end of the XVI century. The original in turquoise blue, ivory, demon-yellow, green and brown, is one of the loveliest examples of Persian art in the Metropolitan Museum. The flat decorative treatment of trees, flowers and figures is worth a great deal of study, as well as the general flowered all-over effect, similar to that of a good chintz. Worthy of close attention, also are the patterns in the women's dresses, probably block-printed calicoes, or possibly silks.

and created many designs for machine reproduction. His patterns were so rich and varied in rhythm and spotting that, even when machine printed, they escaped that look of hardness and fixity so characteristic of the usual machine product. But in spite of the great work of William Morris and his disciples, in improving the tone of the better grade product, the great bulk of machine-produced work in the textile as in other applied arts, still remained under the curse of Victorian naturalism and the blight of crude coloring and machine-like rigidity of style.

In America, where conditions have been as a rule, even worse as regards taste than in England, it has been only in very recent years that designers of textiles have realized the possibility of creating a type of design for machine reproduction that shall still preserve some of the charm and the delightful slight irregularity of the hand-made products. In this attempt our designers have been aided by the modern vogue of hand processes—block-printing, stencilling and batik—and by the comparatively recent revival of interest in oriental design, stimulated in part by the recent popularization in the west of the beautiful medieval miniature and manuscript illustrations of Persia and India.

In these delightful decorations and in the lovely painted and printed spreads from Persia and India, now to be found in nearly all our museums, and occasionally in somewhat debased modern form still on the market, the designer will find material abundantly worthy of his closest study. Here as in the tiles, pottery and rugs of these same wonderful countries he may hope to come upon some of the fundamental secrets of beauty and effectiveness in design. In all these types he will recognize that with their makers the design was the thing.

A Persian miniature illustrating the strictly decorative treatment of figures and landscape. A delightful spring-like quality is obtained by the use of flower-spots thruout the composition.

Cloth Mosaic, 17th century, from Amber, India. A particularly beautiful example of the use of flowers in textile decoration. To be noticed especially are the grace and rythm of line, the simplicity and delicacy of the flower-forms, the interesting grouping of the spots, and the effect of flatness maintained thruout.

Courtesy of the Brooklyn Museum.

and that even when using natural forms they never made the mistake of trying to decorate a flat surface realistically, in other words with a picture. Flatness of surface, that first great essential of all good decorative design is here everywhere achieved by an absence of perspective and of modeling and by the all-over spotting of the various colors. In the textiles are especially noteworthy the rhythm of line, the interplay of brilliant yet harmonious colors, the delicacy of detail and the skill with which the surface is enlivened by an all-over "starring" or spotting with points of interest, usually flowers or flower-like forms. This trick of starring or spotting the surface to be decorated, so peculiarly valuable in textile designs as what modern worker in batik has not discovered for himself, is really hinted at as mentioned before, in the word "chintz" itself.

Designs of actual flowers have not to be sure, always been, and need not, necessarily be associated with chintzes or cretonnes (the French term comes merely from the name of a village in France famous for its weaving). Yet in a true chintz pattern there is something of the growth of flowers, in the repeated spotting of the surface by points or masses of interest. In the original oriental textiles, of which the earlier continental chintzes were imitations, there is an effect as of meadows starry with flowers, and trees bedecked with leaves and blossoms. Not for nothing did the rose and the jasmine and the peony bloom in those Persian gardens of which the poets tell. In all Persian and Indian art there breathes somehow a spirit as of eternal spring and eternal blossoming. It is a part of the charm for us of the art of those lands. And yet analyzed from a designer's point of view, this effect is very largely a matter of the mere skillful repetition of spots. They are delicate and beautiful spots, no doubt, and yet their effectiveness is probably more largely a matter of their skillful disposal upon the surface than of their individual beauty of detail.

In many of our western designs there is a feeling of rigidity as of stone or iron work. For some of this late Renaissance design, with its trick of imitating carved and sculptured architectural ornament of wood or stone or iron in other materials may be held partly accountable. But we tend to imitate in art the things we live among. Perhaps in an age of steel and brick it is not surprising that a certain amount of steeliness and brickiness should get into our art. But let us leave the expressing of such things to our architects and to our Post-Impressionist painters. Textiles after all are soft cloths to be decorated with designs which shall make them look like soft cloths. And nature is still around us, and the love of nature is no less strong in us than it is in the people of the Orient. Our designers will always draw upon nature and natural forms, as they have done in the past, for the greater part of their inspiration. And they will find it to their advantage to study, without ever giving up their own conception of nature, how some of the earliest and surest designers in the world and the creators of some of the most beautiful textiles, have found ways of transmuting natural forms into the material for their art.

Needs of Secondary Technical Education in Nova Scotia

Gerald A. Boate, B. Sc., Assistant Director of Technical Education for Nova Scotia

IN order to determine the types of secondary educational systems which will best suit the Province, city, town or community, a careful analysis should be made, not only of the natural resources, but the dominant types of producing, manufacturing, distributing and trading.

To have a healthy state of industry and trade continue and improve, there must be skilful and conservative utilization of the products of the mines, farms, forests and coastal waters. The natural resources of Nova Scotia are principally mines, forests, farms and fisheries; producing, in the mining group, iron ore, coal, gypsum and in smaller quantities gold, silver and manganese; from the forests are obtained spruce, fir, hemlock, beech and birch; agriculture is principally mixed farming, exporting apples, potatoes and hay; the fisheries group, from an exporting standpoint, is the second in importance, sending to central Canada, the United States and the West Indies canned, dried and salted fish.

In order to improve her condition and increase the status and wealth of the Province, it is not only necessary to produce more, but to produce more economically and efficiently. Coal, iron, timber, fish and deep harbors abound. Why, then, is not Nova Scotia more prosperous than she is? Are we too far north or too far out in the ocean, or do we depend upon the rest of a great continent to supply or manufacture our needs and wants? Is our geographical position less favorable than Massachusetts, which is almost devoid of natural resources, yet supports a large and prosperous population, principally by importing raw materials and thru enterprise and skill, converting them into a marketable product which usually bears the hall-mark of excellency of workmanship to such a degree that the products are eagerly sought by a world's markets.

The comparison is made merely for the purpose of deducing, if possible, the reason for Massachusetts' prosperity and development. The civil war left this State almost devoid of able-bodied man power; as a consequence brawn gave place to ingenuity, and for fifty years after the close of the war there was a period of inventive development which was unparalleled. The invention and development of new devices and machines for the working of metals awoke Boston, Worcester, Fitchburg, Holyoke, Lynn and many other cities to such a state of activity that their populations multiplied and wealth poured in, yet this State cannot show in its list of natural resources either coal or iron. Lowell and Lawrence are celebrated the world over for their cotton mills, but the State of Massachusetts does not raise a pound of cotton. This State dominates the world market for boots and shoes. The hides from which the leather is made are imported from Australia, India and South America. The arms which gather in the raw materials also carry back to the remote corners of the earth manufactured goods. How did this condition come about? Ingenuity alone accomplished it. Capital, a vision backed by honest effort, faith and skilfully trained workers accomplished the miracle. Schemes, dreams and plans were followed by action. From small beginnings mighty organizations were built up.

The demands for constructive effort are greater today than they ever were before. Iron, steel, timber and the fabricated products thereof are needed in unlimited quantities by the civilized world. In order that these materials may be developed into a more refined and acceptable state for efficient shipment, it is necessary that the minds of the people of Nova Scotia be directed to the desirability of providing intensive training for those who are developing the natural resources of the Province. In doing this it will be well to consider the group of workers who fall outside of the professional class.

As a very conservative estimate, not over ten per cent of those who graduate from high schools ever enter professional colleges. We may well pause to consider the vocations of the ninety per cent, who do not attend higher educational institutions, and also the vast army who do not attend school beyond grade eight. What becomes of the boys and girls who drop out of school? Why do they drop by the educational wayside? We do know that they drop out of school, but they also drop into something else. Business and industry absorb the school discards and immediately place them at work "doing something." Without much further assistance they either again drop out or pick up enough training by imitation, to enable them to carry on mechanically, without knowing the cause or reason.

When production is low, or a period of depression comes, the plants where some of them are employed close down, workers are dismissed and become unemployed. The unpleasant task now confronts them of seeking a new position, which, on being analyzed, is one of the most difficult tasks of modern salesmanship—to sell one's own services. What has this uneducated boy or girl to sell or offer a prospective employer? Without assistance the salesmanship is usually so crude that the former experience gained in the previous position is lost in the shuffle and in a majority of cases an entirely new start is made. In this process of drifting from one place of employment to another without guidance or assistance or maturity the worker is classed as a "hand" or common laborer.

Business managements, like political governments, are coming to realize that the basis of any permanent reform must begin and end in education. The tendency to adopt this point of view is indicated by the following examples:

The New York Edison Company, a public utility, selling light and power, offers educational facilities thru its educational bureau and the educational committee of the local association of employers. The committee prepares technical and accounting courses in which the attendance is voluntary. The educational bureau prepares the commercial courses as part of the routine work of the commercial department, and instruction is given on the company's time. These courses include hygiene, health and recreation, the basic principles of salesmanship, company organization, the elements of central station business-getting, and the fundamental principles of electricity. The term begins in October and ends in May. The work covers two years. The school staff consists of a manager, several instructors and a secretary. The technical courses consist of laboratory exercises, preceded by a talk in which the instructor outlines the work briefly. The course lasts fifteen weeks each year, five evenings and one afternoon per week. Besides these courses the company has lectures given by their officials or by prominent speakers on general and public policy, etc., and on technical subjects.

Special training for the company's work is given by the National Cash Register Company, which has established an agents' school for salesmen, one for advertising men, and one for officers for the study of business management, and others for the general staff. This company has a kindergarten for the children of the employees, and cooking, sewing and millinery classes also, as it is realized that any training which benefits the home makes better workers.

The Canadian Pacific Railway provides an apprentice school at the Angus Shops at Montreal. All apprentices are required to attend this school a definite number of hours each week on the company's time. The subjects taught are English, mathematics, mechanical drawing and science. Scholarships are offered by the management, which are sufficient to provide full tuition fees and maintenance of the winners in engineering courses at McGill University.

These examples are merely typical of the conscientious effort on the part of large employers to better the conditions and environment of their workers, as a means for merited advancement. Examples of similar educational efforts could be added to by the score, but those mentioned are typical of this new movement among the most progressive corporations.

The company continuation school is rapidly working its way into all progressive systems of vocational education. The motto of such schools is, "Learn while earning." It is marked by a somewhat broader educational outlook than the company business school. Accordingly we find classes in English, mathematics, history, civics, geography, spelling, hygiene, typewriting, shorthand, sewing and dressmaking. These are all in addition to a number of other subjects directly related to specific occupations, such as engineering, drafting, machine operating, office work, laboratory testing, telephone operation and salesmanship.

Of this kind there are two groups; those schools conducting evening classes and those holding day sessions. The methods of instruction are as varied as the subjects taught, but each type is actuated by the dual aim to make more intelligent and responsible citizens and more efficient employees. The public or private continuation school is cooperative in its nature and requires that the instruction involves both study and practice. The studying is done, however, at the public school and under its direction, instead of being done with the company, and the industrial training is carried out according to a definite plan in industry. This method necessitates the closest kind of cooperation between business organizations and the public school. However, the practicability of this educational method is proven by the increase in the number of firms which are using it.

The development of any secondary educational system, like the development of any national, civic or individual enterprise, requires the expenditure of large sums of money, and in order that funds may be conserved and made to do the greatest amount of useful work careful planning is necessary. The need for developing special secondary technical education in Canada was felt prior to 1910. In 1910, at the request of the Minister of Labor, Order-in-Council No. 1133 was approved by His Excellency, the Governor-General of Canada, on the first of June, an abstract of which is quoted:

"On memorandum dated May 28th, 1910, from the Minister of Labor, stating that the industrial efficiency is all important to the development of the Dominion and to the promotion of the home and foreign trade of Canada in competition with other nations, and can best be promoted by the adoption in Canada of the most advanced systems and methods of industrial training and technical education.

"The Minister further states that the premiers of the several Provinces of the Dominion have expressed on behalf of the governments of their respective Provinces, approval of the appointment by the federal authorities of a Royal Commission in Industrial Training and Technical Education."

The Commission, after being appointed, investigated scientifically and exhaustively first the educational systems of Canadian provinces, then it proceeded to England, Scotland, Ireland, Denmark, France, Germany, Switzerland and the United States. The report of the commissioners was printed by order of the Federal Parliament and distributed in 1913. The work of this commission resulted in the passing of the Technical Education Act in 1919. This act provides for aid to the provinces in promoting and assisting technical education in Canada, by annual grants beginning at $700,-000 and aggregating $10,000,000 within a period of ten years.

If the federal appropriation for developing secondary technical education is matched dollar for dollar

by the provincial government, Nova Scotia will have a fund of $116,000 to be expended during the fiscal year 1919-1920. The problem confronting the administrators of the fund is how this amount can be best expended to meet the immediate needs of the province in the advancement of technical and industrial education, at the same time getting the desired maximum of permanency from the investment.

Within the last ten years in the larger cities of Europe and the United States special technical high schools have been built, the buildings and equipment costing from $2,000,000 in the larger and more elaborately equipped structures, down to $75,000 in the smaller types, usually converted wooden buildings. Usually such schools are designed as a general high school, so far as academic rooms are concerned, but in addition space is provided for: (1) Mechanical and architectural drawing, (2) machine shop, (3) sheet metal and plumbing shop, (4) electrical testing and applied science laboratory, (5) chemical laboratory, (6) building construction and electrical wiring rooms, (7) power and hand-working shops, (8) applied art and design rooms, (9) painting and decorating rooms, (10) domestic science kitchens, (11) dressmaking rooms, and (12) millinery rooms.

The special aim of such a school is to serve both day and evening classes. Special emphasis is laid upon the newer aspects of school work, and practical subjects are given a generous allotment of time. The elements of a liberal education are, however, by no means neglected, but are made more interesting because enriched and vitalized by a new content and purpose. Syllabi of courses are so arranged by the group method of instruction that those possessing satisfactory high school entrance certificates may elect courses which lead to college matriculation, thus laying a splendid foundation for applied science college courses. Other courses are designed to lay a foundation for entrance into industry or commerce after leaving high school.

Usually the work covers a period of four years. Cities always have another group who enter a technical high school with the specific purpose of learning the fundamentals of a trade or occupation which will give them an entrance, at an early age, into remunerative employment. The educational standard set up is usually successfully passing grade eight examinations, or sufficient education to profit by the instruction given in the classes, and to be at least 14 years of age. These groups are given either prevocational or vocational courses. The first year they are in the boys' division, routed thru the various shops in order to determine their mechanical aptitude. When mechanical skill or fondness for certain commercial work is apparent they are counselled by their instructors regarding the vocation which they might advantageously follow. The girls are likewise routed through the home-making, art and design, cooking, sewing and commercial rooms.

The courses usually given are machine shop practice, automobile mechanics, carpentry and joinery, sheet metal work and plumbing, architectural drafting, mechanical drafting, building construction, applied physics and chemistry, applied mathematics, grammar, composition and spelling, geography and history, industrial art and design, household management, home nursing and hygiene, domestic science, dressmaking and millinery, study of textiles and materials, physical culture, music and French. In the day school the student program may be general, leading to matriculation, or special, leading to diploma which states definitely the special work covered. In the evening classes single subjects are usually selected by industrial and commercial workers, who avail themselves of evening technical school for improving their training.

The types of secondary schools which have been developed during the last fifteen years in Canada and the United States include technical high schools, trade schools, industrial art schools, continuation part-time schools, correspondence schools, vestibule schools and upgrading schools in industry, commercial schools, university extension courses, home economy training centers, women's institutions and classes. The chief difficulty lies not in establishing schools of technical nature, but in selecting from the large array the types and forms of training which will best suit the needs of the entire Province. The chief industries of Nova Scotia are iron and coal mining, the manufacture of iron and steel into products of these metals, including machinery, lumbering, agriculture and fishing. Each division is large and has many subdivisions, which are capable of development and expansion in order that the pulses of our trade and commerce may be filled with richer blood of new endeavor.

From a broad viewpoint it seems wise, for the present at least, to defer expending large sums of money on the erection of secondary industrial school buildings, and to devote our untiring energies to the serving of our industries at their doors by bringing the most desirable training to the workers at their daily tasks. This may be satisfactorily accomplished in several ways:

For the coal mining industry, the development of more advanced instruction in the present coal mining schools, cooperating with the managers of the industry in providing both evening and part-time day classes.

For steel mills, machine shops, foundries and factories, in the establishing of vestibule schools within the industry, the equipment to be supplied by the manufacturer and suitably trained instructors to be provided by the province, for the more efficient training of junior employees or apprentices, space to be supplied either attached or detached, for classrooms in which to give instruction in mathematics, drafting, English, history and civics, either by the manufacturer, the community or cooperatively.

For business and commerce, the development of business schools which will fill the needs of part-time day and evening students, so that training will not only

be in business correspondence, English, spelling, grammar, penmanship and bookkeeping, but will embrace the fundamentals of salesmanship, factory and office management, commercial law, modern languages, and also the economics of business and sufficient training to give a comprehensive understanding of the laws which govern capital and labor.

Forest conservation and reforestation and educational work which will lead to the economic use of the products of our forests are highly desirable. Also the extended manufacture of lumber into marketable products.

The fishing industry, which employs 27,000 Nova Scotians, offers a fertile field for the advancement of training and skill. This refers to deep-sea fishing. In order to attract a larger market and demand relatively higher prices there must be improvements in the methods of pickling, drying, smoking, canning and distributing the fish product. In this field courses of an extremely practical nature can be given to the fishermen in the care, operation, repair and overhauling of gasoline marine engines, in navigation at the fishing villages during the winter months, which will shorten the period necessary at the government navigation schools, in the testing of salt and brine solutions for purity and density, and the sanitary methods of handling the catch while at sea; and short courses in bookkeeping, penmanship and business, spelling, marketing, banking and exchange. Further developments of educational work which will assist the fishing industry will be planned and executed as soon as funds can be provided and cooperation arranged.

Already splendid work is being done at the Provincial Agriculture College at Truro, in general and special agricultural subjects. However, much assistance can be given agriculturalists by giving special courses in the care, repair and overhauling of power apparatus and power driven machinery, as gasoline engines, steam boilers, tractors, pumps, grinders, threshers, sulky-plows and all mechanical appliances which are rapidly appearing on Nova Scotia farms, and the correct handling of which needs working knowledge of mechanics and applied electricity and the correct use of machinists' tools. The training should be in the actual overhauling, taking down, assembling, testing and adjusting, the renewing of wornout or broken parts, and economic operation. Some practical training in the use of blacksmiths' and carpenters' tools and harness repairing is desirable.

Emphasis should be placed on the extension and expansion of the evening technical schools in order that they may serve more fully the needs of the larger communities.

Those in rural districts, or so engaged that it is impracticable, should have their interests cared for by means of correspondence courses, on which such a satisfactory beginning was made by the Nova Scotia Technical College, but which had to be suspended during the war. In the preparation of the lessons and the selection of the subject matter every effort should be made to establish a bureau which will radiate a warm personal relationship and be of the utmost service to the people of the province. The courses should be short and extremely practicable, and so prepared that they will assist in their work the carpenter, the builder, the mason, the draftsman, the machinist, the plumber, the electrician, the steam engineer, the garage mechanic, the sheet metal worker, etc., and for women, dressmaking, millinery, home nursing, household management, and general education for both sexes.

Industrial training and technical education serve to supplement general education with special reference to the requirements of workers in the industries, agriculture, commerce, transportation, mining, housekeeping and other occupations. They are the means whereby the individual, the family, the community and the nation seek to develop the powers of the individuals for work, to prepare themselves to meet the conditions of working life, to alter those conditions in directions which seem desirable, and to conserve what is esteemed to be worth while in knowledge, customs, methods, institutions, standards and ideals. In order that all might become qualified to the full extent of their capacities to fill their places as individuals, as contributing earners, as citizens, and as members of the race, the present and future development of technical education and industrial training in the Province of Nova Scotia will be planned and administered to fit the fuller needs of Nova Scotians.

PAPER CUTTING BY A VIENNESE SCHOOL BOY.

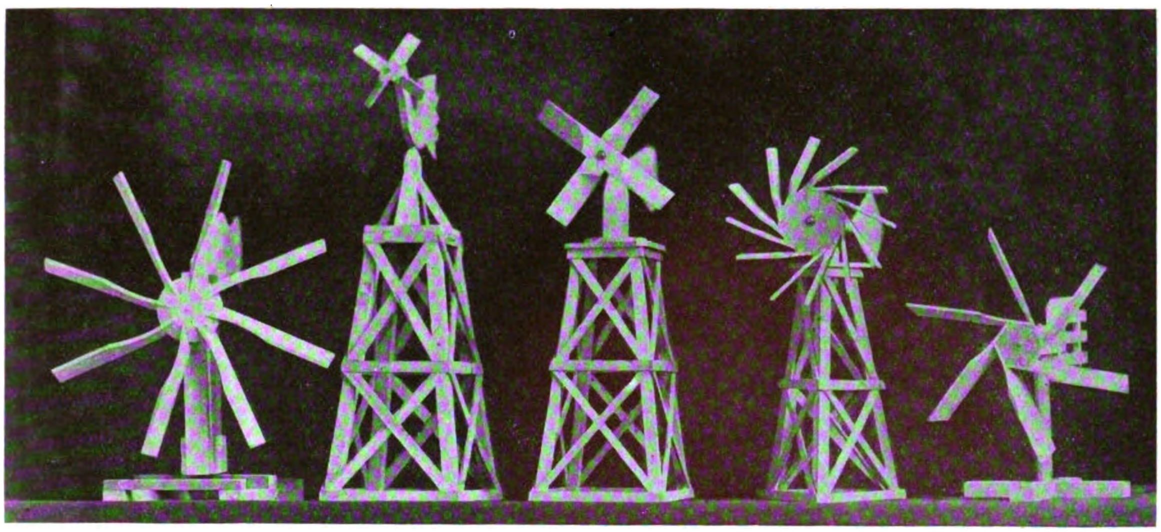


FIG. 2. TYPES OF WINDMILLS MADE IN THE AUTHOR'S CLASSES.

Teaching Fifth Grade Woodwork—The Wind Mill

Fred L. Curran, Supervisor of Practice Teaching, Stout Institute, Menomonie, Wisconsin

THE fifth grade boy is full of life and energy. He is interested in moving things and in making things that move. He is probably a "self-starter" in almost any line of endeavor, and if he had his way, everything would be running on "high speed" most of the time. Because of this some of our industrial arts work in the fifth grade has not been suitable. Either it was not the type of work that the boy was interested in or it took too long for the boy to get results.

Thru years of experimenting we have eliminated many forms of handwork in the fifth grade. We have tried bent iron work, paper and cardboard work, weaving, basketry, clay modeling, whittling, coping saw work and bench woodwork. Some type of work involving the use of a few common woodworking tools seems at present to be most in favor. The hammer, back saw, coping saw, try square, rule and compass are the principal tools used. The plane and chisel may be used, but they should probably be used more as a necessity in bringing in a variety of projects.

Difficulties in Teaching Grade Woodwork.

Much of the difficulty in teaching fifth grade woodwork comes thru the types of work which have been attempted. To select and design problems which boys at this age can make fairly well and in short enough time to hold their best interest is not an easy task. We shall probably find, however, that by omitting most of the planing and by having most of the stock reduced to thickness and width in the mill we can offer many problems which are satisfactory. Because of the necessity of having much of the lumber reduced to two dimensions in the mill it will effect economy to standardize sizes as much as possible. In the windmill project described in this article, there are only five sizes of stock and these same sizes can be used in many of the other problems of the course.

The Wind Mill Project.

The wind mill fulfills most of the requirements of a satisfactory problem in the fifth grade. It is rather easily and quickly made; it has moving parts and will be taken home and fastened up somewhere by most of the boys. The stock is all cut to thickness and width in the mill. The work left for the boy is to make measurements accurately, cut to line carefully, and assemble in such a way that the finished result—the wind mill—shall stand plumb and square and run well.

In teaching the wind mill it is necessary that the teacher demonstrate each step carefully and completely. He will demonstrate the making of one complete side of the tower, making sure he has selected a good way for the boys to determine the slant of each of the two posts. When some in the class have completed one side he will demonstrate the nailing on of the strips on the third side. The teacher will also demonstrate the laying out and cutting of the cross lap joint in the wheel and the laying out and cutting of the blades of the wheel. The cutting of the blades is best done with a sloyd knife or a jack knife. The making of the vane, fastening it to the beam, making the short post and fastening it to the platform, all will need demonstration. The final lesson of balancing the wheel, boring holes, assembling and trying out in the wind or in front of a hot air ventilator, will be most interesting of all if the teacher enters into the spirit of the occasion and inspires the boys to feel the value of accomplishment.

What Have the Boys Learned?

Besides the general dexterity in the use of tools in construction work, and the knowledge gained thru the use of the tools, there are some definite points of value in the wind mill problem. First, the boy should learn a few simple facts regarding braced construction,—where they are used, and the strength and rigidity produced by the cross bracing. He should also learn the best ways

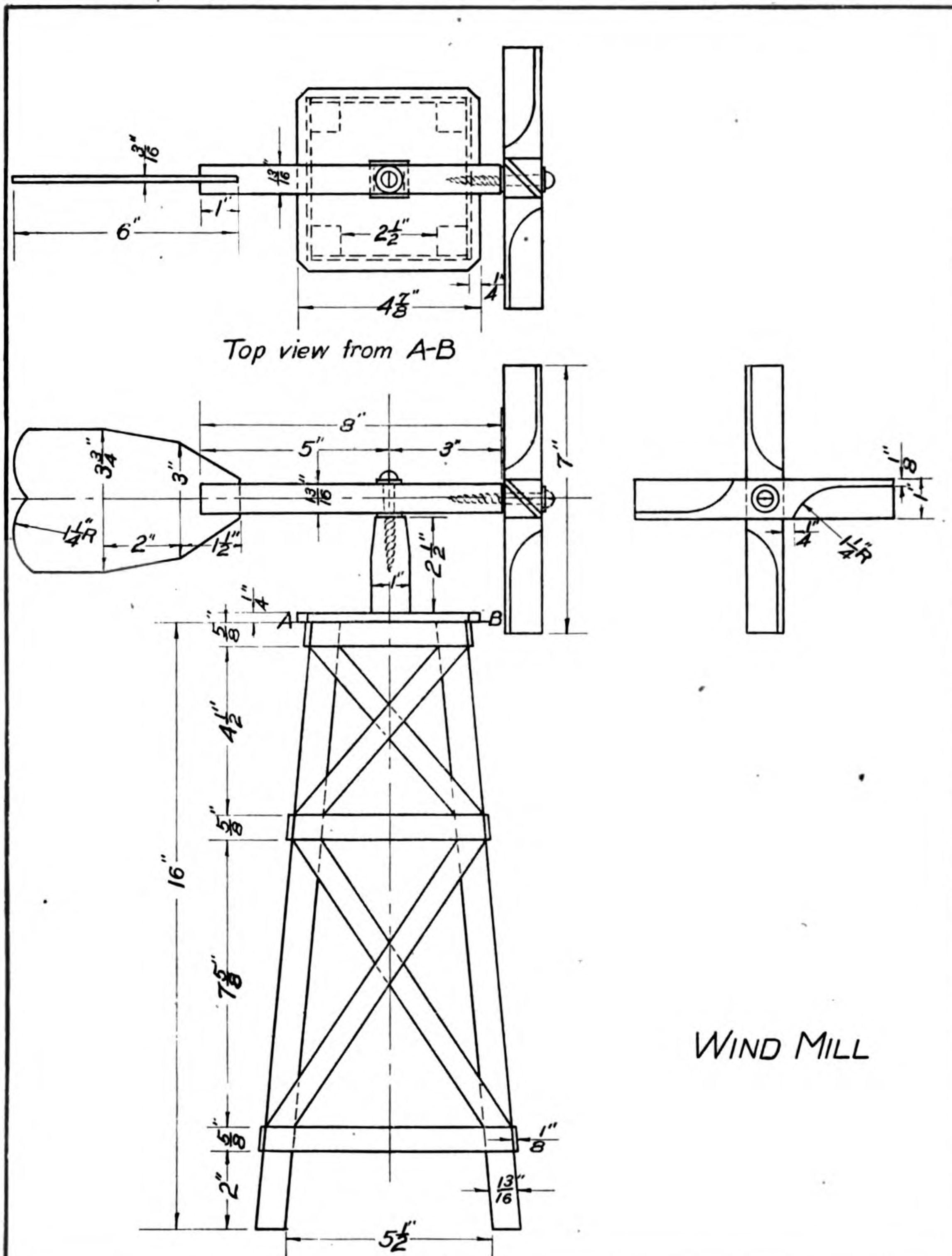


FIG. 1. DETAILS OF WINDMILL FOR FIFTH GRADE WOOD WORK.

of nailing on braces. Second, he should learn to do some thinking and planning in a construction of this kind. He should be led to ask himself, "What is the best way to go at the making of this tower?" "What shall I do first?" "How can I test it to see if it stands plumb or straight up?" Third, he should strengthen his powers of observation with reference to just *how* the wind turns the wheel and as to whether the angle of the blade makes any difference in the amount of power produced. Boys at this age will not, of course, think very deeply into any of these problems but they should be led to think in these directions and led to observe the things which later on will furnish a foundation for scientific study.

In Fig. 2 several types of wheels are shown. Some of these may be used in the fifth grade, but most of them are better suited to sixth-grade classes.

UNIT HIGH SCHOOL COURSES IN PRINTING

R. A. Loomis, Instructor in Printing, Dickinson High School, Jersey City, N. J.

The student who enters the printing course in the high school need not become a printer, any more than that he become a chemist if he take up the course in chemistry. Printing is an excellent subject for general educational purposes, and any student in any department of the high school may take printing with much benefit.

What work is there that enters more into the daily life of the people than printing! And yet, how few people are there who are informed about printing processes! As you read these lines, do you know how the words are made to appear before you on paper? Have you any idea of how paper, type and ink are manipulated to produce a printed page? Do you know anything of the history of the methods used to record events from the beginning of crude markings on stone, to the present highly developed technical processes of printing?

Printing with movable types was one of the most important discoveries that came near the end of the middle ages. Printing with lines of type is one of the great inventions of the nineteenth century, the work of several Americans. Almost daily, new improvements are made in printing so that the public may have more and better printed books, magazines and advertising.

The high school course in printing cannot only give elementary training leading to the trade, but at the same time, it can be one of the important subjects in a liberal education. In the institution with which the writer is identified, any pupil in any of the three departments—academic, commercial or industrial—may enter the printing class. Of the students who do enter the class, some became interested enough to become quite proficient so that they do well when they enter the trade. The instruction offered is general, as well as specified, and brings interest along the line of several of the industries connected with printing. We might recount here the experience of a number of successful young men who have taken up machine composition, advertising, etc.

The dual purpose of the high school course in printing requires that the work be organized quite differently from the courses in a trade school. The fact that many students entered the class for general educational purposes, while others have distinct vocational plans in mind, and the fact that many of the former students will possibly enter the trade, makes it necessary that the work be general and broad, and at the same time, technical enough that all fundamental principles be thoroly mastered and practiced. It is perfectly possible to accomplish this by organizing the work, so far as the trade is concerned, in unit courses and by giving the academic, or general information, in class talks and in supplementary problems involving printing, design and layout work that will result in good judgment concerning the selection of type and the arrangement of printed pages.

In order to accommodate pupils at any and all times of the day, in any numbers, and for irregular periods of time, the unit course seems best. Thus, by organizing group classes, to meet once or twice each week, it is possible to reach all in the shop with actual shopwork, lectures and layout work, and to make the training and information adequate.

The organization of unit courses of instruction in printing divides itself into three natural divisions—trade work, academic work and layout work. The trade work is first given. The pupil learns the simple elementary operations of hand composition and follows his job thru proofreading, imposition, presswork and distribution. He does several jobs which are elementary and simple, until he is competent to carry any ordinary job thru. In class work he is instructed in the methods of doing these several trade operations. After he has become sufficiently proficient in the simple work, he is given more difficult jobs and the class work becomes more academic in character. General informational talks are then given on processes in industries related to printing. After the student has become quite familiar with type faces and has acquired some ideas about the arrangement of type thru shop practice, layouts and study of specimens of printing, he is then ready to undertake layout work and to express himself in printing design.

Unit courses given below have been developed by the writer in the Dickinson High School as a result of several years of teaching experience. They seem to be perfectly adapted to attain results in the writer's classes. Only the titles of each unit are given, but a few questions are added to indicate a part of the content of the unit, and to give a clue to the information which the teacher may demand.

CONSECUTIVE OPERATIONS UNITS IN PRINTING.

The following units cover the ordinary operations in consecutive order that a printer must perform in producing a printed job. Each operation is fully described and where necessary diagrammed. It is intended to guide the printer thru the different parts of the work from composition to distribution.

In order to give an idea of the content of each unit a few questions are given after each unit.

OPERATIONS UNIT 1.

In this unit the beginner learns the case; to hold the stick; to remove type from stick; to tie up the type; to set the stick to even picas.

Questions:

Why is the type case arranged as it is?
What is the most convenient way to hold the stick?
Describe how to remove type from the stick?
Describe the point system?
Diagram the proper position for type in the galley?
How is the stick set to even picas?

OPERATIONS UNIT 2.

It is expected that upon completion of this unit the student will be proficient in the proper practices in paragraphing, justification and grammatical applications to typography.

Questions:

When and how is a line properly justified?

Diagram and explain the naming of spaces and quads?

What is a pica, nonpareil, point, em?

Distinguish between p and q in type?

Describe how a paragraph should properly end and begin?

Write six words that should not be divided?

How should the quads and spaces be arranged in ending a paragraph?

What is a slug, reglet, metal furniture, metal quotation, lead, descending letter?

OPERATIONS UNIT 3.

After having completed the work in this unit the young printer should be able to take a proof, mark proof, and correct the type according to his corrected proof.

Questions:

Describe how to take a simple wet proof with a proof planer?

Write and explain the meaning of ten proof marks?

What is a "run over"?

What is an "out"?

Describe how a correction should be made in type?

OPERATIONS UNIT 4.

This unit teaches the proper method of locking up a job for the platen press.

Questions:

Diagram and label a simple locked up form.

What is a quoin?

What is the proper order to lock up quoins?

If type falls or pushes out what should be done then?

What is the key?

Why is it better to lock type with the head toward the left?

OPERATIONS UNIT 5.

The very beginnings of presswork are explained in this unit. The student's first printing exercise is made ready on the press.

Questions:

What can be said about preparing the press for the job?

What is the tympan sheet and how is it attached to the press?

How is a job centered on the press?

OPERATIONS UNIT 6.

The proper way to feed the press and something about presswork are explained in this unit.

Questions:

What is presswork?

What is the tympan?

What are the grippers?

Describe how to feed the press properly?

What causes offset?

OPERATIONS UNIT 7.

Something about stock cutting is learned in this unit.

Questions:

Describe by an example how to figure stock cutting.

Why is it good practice to place a sheet of cardboard under and over paper while cutting it?

What are some of the common sizes of card stock, book paper and letter paper?

How many sheets in a printer's ream?

OPERATIONS UNIT 8.

This unit has to do with the final operation in printing: distribution of the type.

Questions:

Describe how to remove type from the chase.

Why is it necessary for the distribution of type to be done accurately?

What can be said about the distribution of spaces and quads in the process of distribution?

SUPPLEMENTARY UNIT.

In this unit practice is given in the figuring of type for space areas. By the use of a table any amount of copy can be figured to fit a certain amount of space or the number of words in any given amount of printed matter may be estimated.

UNITS IN LAYOUT WORK.

UNIT 1.

Straight Composition Exercise in which the student learns how to fit a certain number of words to a certain space area. Rudiments of layout in which the customary methods of dimensioning are learned and the proper way to label layouts is practiced.

This exercise is a description of straight composition and distribution.

Questions:

Describe how the number of words in any type page may be estimated.

What is the method for estimating the number of words set in a certain size of type that a type written page of copy will take?

How should a layout be labeled to show length of lines of type and length of whole composition?

UNIT 2.

Straight Composition with an Initial Letter.

In this exercise the pupil learns how different kinds of initial letters are used so that they will harmonize with the text.

Supplementary exercises using the initial letter give experience in setting compositions in capital. General shape of letter is made to harmonize with the general shape of the composition in another.

Questions:

In using an initial letter what should be the character of the letter to look well with a Roman type face?

UNIT 3.

Straight Composition with Initial Letter and Border.

This exercise teaches the proper use of borders. The kind of border for the character, shape, style, size and kind of type to be used for a certain kind of work is studied.

Questions:

If an advertisement for a millinery store is being set what kind of a border should surround it?

UNIT 4.

Straight Composition Exercise in which the Initial Letter or the Border may be run in Color.

Colored borders and initial letters in combination with body matter in black are studied. This is more easily done by studying the work of others.

Questions:

If a quotation card is wanted to be set in a horizontal rectangular shape with a border and initial letter in color what kind of an initial letter should be used if an expanded body type is to be used?

If a vertical rectangular quotation card is to be arranged what should be the general character of the body type and the initial letter?

UNIT 5.

Personal Cards.

This unit is a study of cards for personal use. In it the student learns the general sizes and shapes for proper cards for men or women and the character of type to be used on either.

Questions:

What is the shape generally of a man's card?

What kind of type could be used in good taste on card for a doctor?

What is the proper position for the name to be printed on a personal card?

UNIT 6.

Business Cards.

When making layouts for this kind of card the student learns how to balance the matter on a card and to select the kind of type that will harmonize with the character of the card.

Questions:

If a hardware man were to give an order for cards what should the general character of the type be that is used on it?

What is the arrangement of the content of the card when there is a large amount of copy to be set for it?

UNIT 7.

Tickets.

This is a large subject but some of the accepted good forms are studied and copy arranged for them.

Questions:

What are the principal parts of a card that should receive emphasis by means of the type?

If a ticket is to be arranged for a musical concert what should be the character of the border or cut that are used on it?

UNIT 8.

Letterheads, Envelope Corners, Billheads.

It is very often customary to use the same general character of arrangement and type on office stationery. It is good form to have these jobs done with the same style of type and color of paper and ink.

Questions:

If office stationery is ordered for a bank what should be the general character of the type and what quality in business should the printing suggest?

Why would it be poor judgment to set a letterhead for a manufacturer of boilers in shaded Old English type?

UNIT 9.

Labels and Tags.

Package labels admit considerable freedom in design. The printer can express his judgment in this work. The main feature should be its legibility and lack of over decoration. Study of samples of this job gives training in treating the work properly.

Questions:

What kind of a border would be proper to use on a label printed for a florist?

What kind of type should be used on a shipping tag for a hardware store?

UNIT 10.

Dance Orders.

Different specimens of this work are studied and good judgment in the arrangement of the job is secured in this way. Simplicity and legibility are the principal features of an ordinary dance order.

Questions:

When titles of music and names of dances are mentioned in the dance order how should they be arranged?

About how large should a dance order be?

UNIT 11.

Programs.

This job should strive to be easily read. Margins should be ample and if it is a folder program the quality of paper used should be such that it does not rattle when the program is turned.

Questions:

What kind of type is best to use on a program?

Why is it good form to stick to simple type arrangement, few ornaments and good paper stock for a program?

UNIT 12.

Menus.

Menus and programs both should be very easily read. Caps and lower case should be used and strong contrast in color of paper and ink should prevail.

Questions:

If a menu to be used on a Pullman car is to be produced what kind of type should the layout man select?

What is the popular style of arrangement of items on a menu card?

UNIT 13.

Cover Pages.

The diversity of arrangement that may be used on a cover page and still be in good form is very large. It is always good design to be simple in arrangement and not too elaborate. When all of the borders and ornaments that can possibly be put on a cover page are used the result will most likely be a jumble. Study of samples from good printers is the best method to secure good work.

Questions:

What kind of type should be used on a cover page for a furniture catalog?

What general kind of border would go well with a light face gothic type on a cover page?

UNIT 14.

Posters and Placards.

In this job the parts of most importance to the reader are given prominence so that he who runs may be able to read. Attraction and holding power in the poster must be its principal qualities.

Questions:

What help does a border give to a poster?

What is the main thing to be given prominence in a poster?

What effect does proper color combinations have in a poster?

UNIT 15.

Tabular Composition.

In the study and arrangement of tabular work the proper arrangement of figures is learned. When figures are set in columns they should line up at the decimal point. Roman numerals also are arranged in a regular way and the good printer always recognizes good form in this regard.

Questions:

Why is it proper to arrange numbers in columns so the decimal points are in line?

When a fraction is printed with a number where is it placed when set with a column of figures without fractions?

UNIT 16.

Rule Composition.

In as much as rule compositions usually permit of either being set in single or double form, judgment as to the best method can be developed by studying rule forms produced by other printers.

The arrangement of rules and separating materials so as to give best looking job and easiest to lock is studied and determined before the job is begun.

Questions:

What is a double form rule composition?

What is the advantage of a double form rule composition over a single form?

What kind of spacing material is best to use when setting rule forms by hand?

EDUCATIONAL UNITS.

The following units may or may not be given along with the regular or trade work in printing. In the high school where the work is broken up more than it is in a regular vocational school a class period each week is given over to the imparting of information concerning things connected with printing but of a general educational character in regard to printing.

This work is divided into five natural divisions, based on printing equipment: type, presses, ink, paper and rollers.

This work is conducted in talks aided by specimens, materials, pictures and drawings. The purpose of these units is to give the student a larger idea of the printing business so that he will be more intelligent about it.

TYPE UNIT 1.

History and development of the alphabet, type case, writing, wood block printing, and printing.

TYPE UNIT 2.

Men connected with the early development of printing.

Influence of printing on history and education.

TYPE UNIT 3.

Scientific principles of chemistry and physics used in the process of making type and other printing surfaces.

Designing foundry type of different sizes.

TYPE UNIT 4.

History and development of type composing machines, line casting machines, type casting machines.

TYPE UNIT 5.

Making plates for color printing.

TYPE UNIT 6.

Explanation of the following machines and processes: Foundry type, linotype, monotype, electrotype, cerotype, stereotype, nickelotype, aluminotype, zinc etching, engraving.

TYPE UNIT 7.

Explanation of the following machines and processes: Wood engraving, steel engraving, wax engraving, photo-engraving, rotogravure, electric typewriter, neostyle, stylograph.

TYPE UNIT 8.

Explanation of the following machines and processes: Multi-color, multigraph, lithograph, intaglio, offset, embossing, embosso, printex process, wall paper.

TYPE UNIT 9.

Explanation of the following machines and processes: Ruling press, color plates, wood block, patent leather, linoleum, stenciling.

TYPE UNIT 10.

Discussion of possibilities as a compositor. Trade practices and union methods explained.

TYPE UNIT 11.

History and development of the printer's stick.

TYPE UNIT 12.

Distribution and care of type and type cases.

PRESS UNIT 1.

Principles of mechanics involved in the operation of presses. The three general classes of presses (diagrammed).

PRESS UNIT 2.

History and development of printing presses and of men connected with the early development of them.

PRESS UNIT 3.

Study of cylinders, web, color, lithgraphic, intaglio, engraving and offset presses.

PRESS UNIT 4.

Hand feeding and automatic feeding of job presses.

PRESS UNIT 5.

Discussion of the development and final stages of the present day newspaper presses.

PRESS UNIT 6.

Study of platen presses, kinds and uses: job, embossing, engraving, cutting and creasing, automatic, hand fed, foot power, hand power, motor driven, Washington hand press, proof press.

PRESS UNIT 7.

Study of cylinder presses, kinds and uses: two revolution, stop-cylinder, automatic, offset, color, newspaper, autopress, Harris, Kelly, pony cylinder.

PRESS UNIT 8.

Study of web presses, kinds and uses: newspaper, job, color, offset, wall-paper, wet ink machine.

PRESS UNIT 9.

Discussion of the parts of a printing press, the frisket, perforating and printing; how to avoid accidents on the press.

PRESS UNIT 10.

Discussion about the possibilities for employment in the trade. Trade condition and the union methods explained.

INK UNIT 1.

History and development of printing ink making. Ink making before printing. Permanency of printing and writing inks. Men connected with the early manufacture of ink.

INK UNIT 2.

Chemistry of derivation of colors for tints, black ink and bases for inks.

INK UNIT 3.

Grinders and mixers for ink making.

INK UNIT 4.

Sources of materials used for colored and black inks. The analine dyes used in ink making.

INK UNIT 5.

Study of dyes, natural colors, dryers, bronzes and reducers.

INK UNIT 6.

Inks for different kinds of work: litho, offset, news, job, engravers. Iron oxide in ink. Transparent and opaque ink. Copying ink and ink dopes.

INK UNIT 7.

The harmonizing of colors by the use of the color wheel.

INK UNIT 8.

Inks for different purposes: bond, halftone, job, doubletone, poster, evaporating and absorbing.

INK UNIT 9.

Mixing colors and bronzing.

INK UNIT 10.

Possibilities for employment in the ink making business.

PAPER UNIT 1.

History and development of printing and writing materials.

PAPER UNIT 2.

Materials used in the manufacture of paper.

PAPER UNIT 3.

Discussion of watermarking, blotting paper, coloring paper, deckle edge paper, machine and hand made papers.

PAPER UNIT 4.

Discussion of other materials used in printing: leather, tin, wood, celluloid, aluminum.

PAPER UNIT 5.

Discussion of paper materials: photographic and blue printing papers; pulp board; fibre board; beaver board; plaster board; linoleum foundation.

PAPER UNIT 6.

Discussion of static electricity in paper and atmospheric condition as they affect paper.

PAPER UNIT 7.

Possibilities for employment in the manufacture and marketing of paper.

ROLLER UNIT 1.

History and development of the roller making processes.

ROLLER UNIT 2.

Composition and methods of manufacture of printers' rollers.

ROLLER UNIT 3.

Chemical and physical properties of substances used in roller composition and how they are affected by the weather.

ROLLER UNIT 4.

Care of rollers. How to protect rollers on a rule form.

ROLLER UNIT 5.

Discussion of the different kinds of rollers: for, distributing, fountain and vibrator; roller bearers; recasting of rollers.

ROLLER UNIT 6.

Possibilities for employment in the roller making business.

THE COLUMBINE CONVENTIONALIZED

C. H. Richert and Otis Philbrick, Rindge Technical High School, Cambridge, Mass.

IT is a far cry from the nodding columbine in the depths of the spring woods to the flat orderly two dimension decoration stenciled onto the border of a curtain or painted on the top of a box.

Just how to, or why, you should follow the trail from the natural flower to the conventionalized shapes are questions that vex the average student mind greatly, but a clear understanding of the process is necessary in any approach to design and its application.

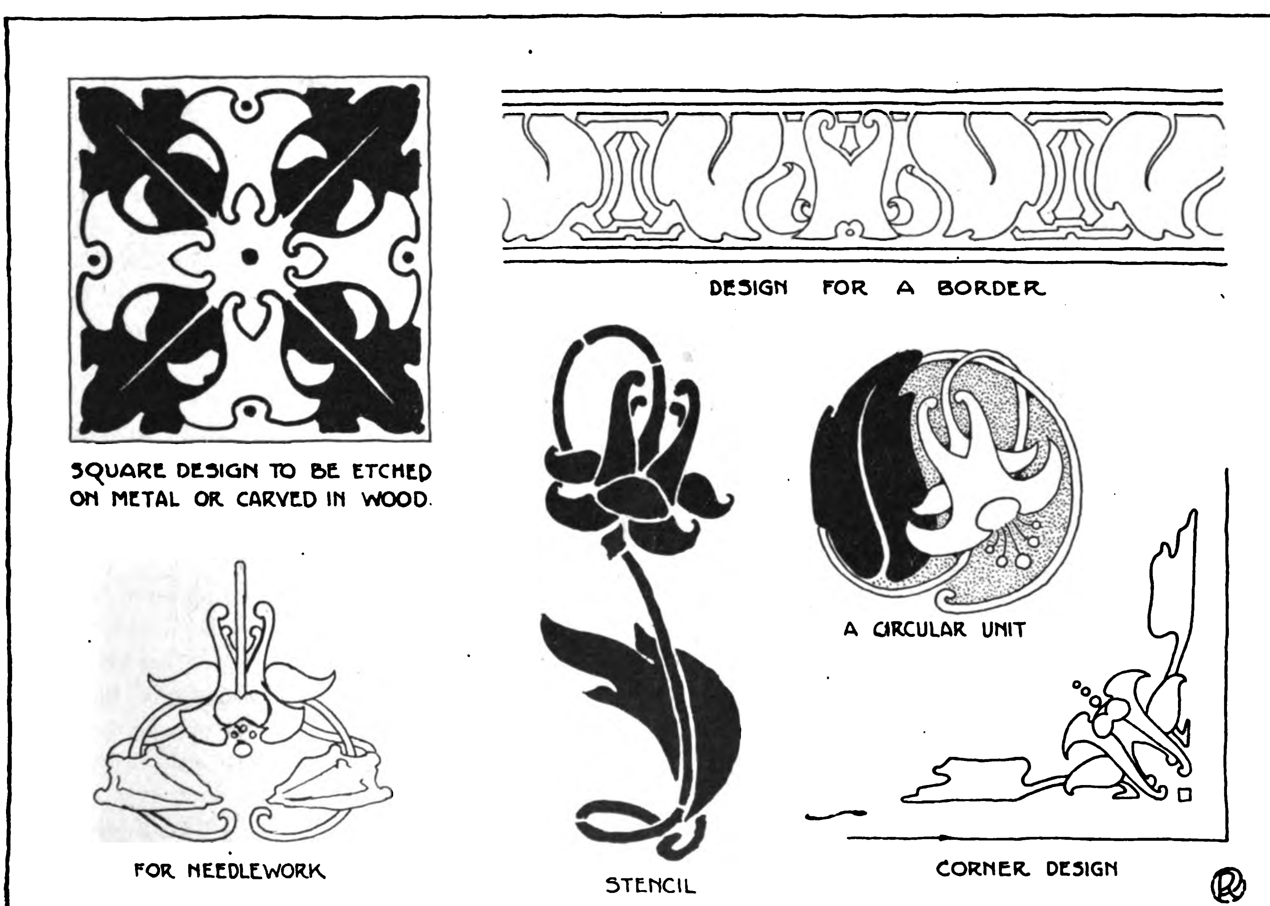
The columbine is a handsome thing in its natural state and the question naturally arises as to why it should not be used as it is. In a large sense it cannot be used as it is—exactly as it is, for, growing it has three dimensions, it has color, it has life and all this against a background of leaves and stems, twigs and rocks. The moment you draw it in outline on a flat piece of paper—no matter how faithfully you copy—you have begun to conventionalize it—the first step has been taken toward making it more suitable for decorative purposes. It might now happen to fit a given space nicely and seem to lend itself to your design without further alteration but, if so, it would be more or less accidental and design should not be accidental. The word design means intention and intention is the opposite of accident.

Most students feel at first that they are going wrong if they make their designs anything else but a direct imitation of nature. It is hard to get them by that point. But when once they do get by, a wonderful and fascinating field is opened up to them.

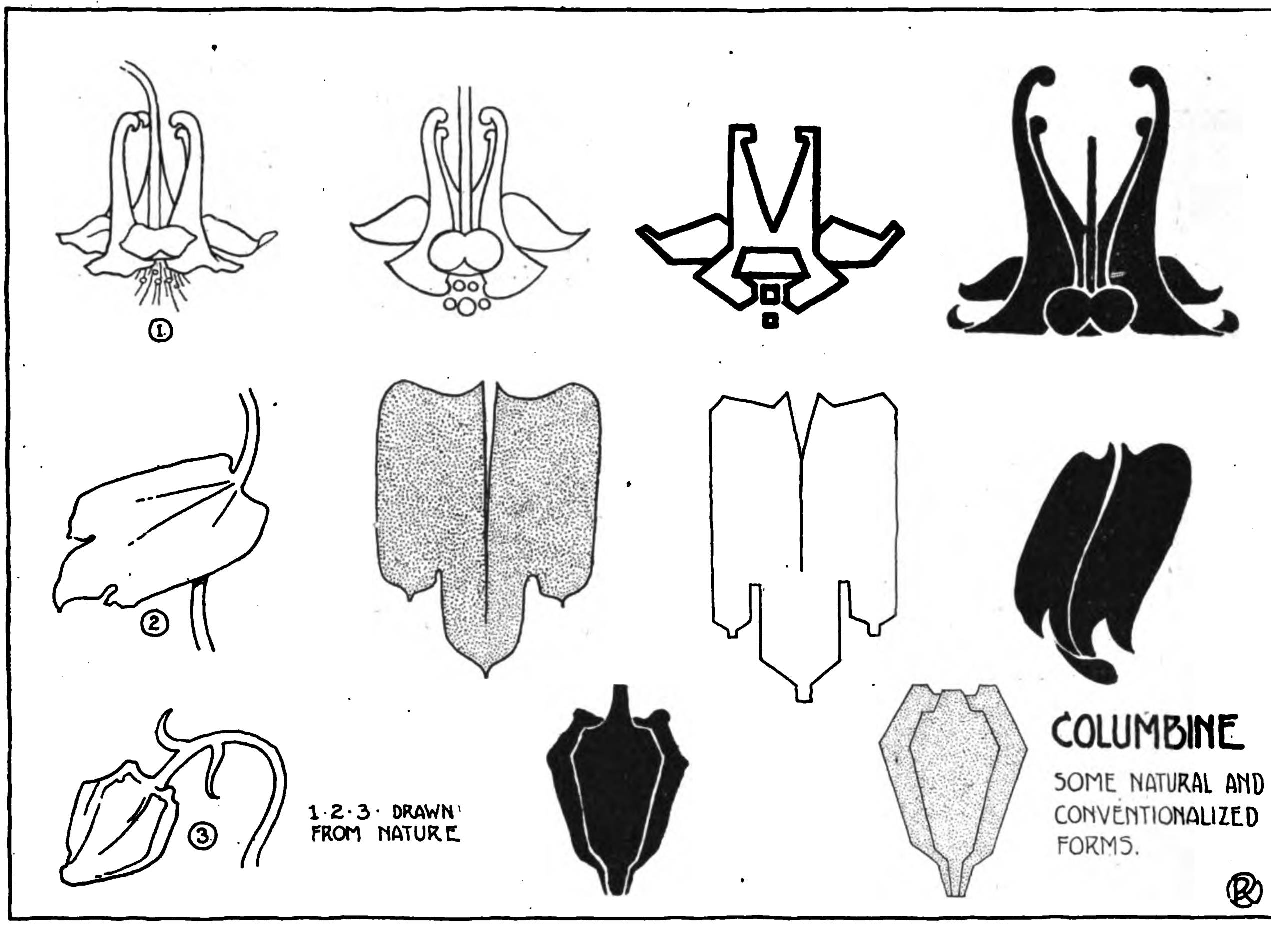
Compare the columbine drawn directly from nature, with the modified shapes made from it at the right. The first one has taken advantage of the curves, they have been made more regular and more suitable for decorating a flat surface. For one thing it will stand repetition better. The next one is made up entirely of straight lines.

It has a husky look and even tends slightly towards the humoresque. The last one is a decorative combination of straight and curved lines. Hundreds more could be made without exhausting the possibilities of the source.

Each of these three shapes radiates the personality of the one who modified them. Three more by someone else would show a different viewpoint and a different personality, so that the natural flower presents an open door into an unlimited field of pleasing shapes and stimulating spaces to those who use it as a theme or motive in this manner, but a closed door to those who only seek to use it as a direct imitation of nature. Mul-



CONVENTIONAL DESIGNS BASED ON THE COLUMBINE.



SUGGESTIONS FOR NATURAL AND CONVENTIONAL FORMS OF THE COLUMBINE.

tiply the possibilities of this one blossom by all the growing forms in Nature and some idea of the broadness of the subject and its inexhaustible source of supply is the result.

Old Mother Nature showed a kindly spirit in furnishing so lavishly with motives for designs and gray matter to employ in making use of them.

The other drawings on the same sheet show the leaf and bud of the columbine conventionalized in the same manner as the blossom.

From the material on this sheet six completed designs have been made and grouped together on the second sheet. These designs may be used for a variety of purposes. The design in a square might be etched in metal for the top of a box or, if done in enamel with leaves of blue green, blossoms of dull orange and a warm gray background it would be attractive. In using the border it might be left in outline or treated with tones and flat colors. Stencils are always usable and practical. The one shown might be used as it is in its nonbilateral form or if traced and drawn about-face either to the right or left of the one shown will form a bilateral unit that would lend itself easily to making batik. The design for needlework would be appropriate for a towel or table mat used singly or repeated upside down below itself to form a diamond. It might also be repeated around the center of a square. The corner design might also be used for needlework, or wood carving. It would also be just the thing for one corner of a hot dish stand—the details of construction of which will be given in a later article.

The columbine as used in these completed designs has been conventionalized and modified extensively. Using natural forms in a slavish imitation of nature is not conducive to good design. This cannot be too constantly reiterated. A large portion of a design's beauty and fitness to purpose depends upon the way in which the natural forms from which it is derived have been conventionalized.

Tracing paper is a great aid in making these conventionalized shapes. Tracing paper is universally regarded as a medium with which to transfer lines from one surface to another, but it has another important use. The Japanese employ it successfully in getting the simplicity of shapes and frugality of line for which their prints are noted. After carrying on a drawing as near to completion as possible, they lay a piece of transparent paper over it and trace, eliminating all lines not necessary to the clearness and beauty of the design. Then over the result another piece of tracing paper is laid and the same process gone thru again, carrying the elimination still farther. This is done over and over, sometimes seven or eight times, until all superfluous lines have been discarded. The result is simplicity in the extreme. Working along this line a piece of tracing paper can be laid over the blossom in the upper left-hand corner of the chart and a variety of different modi-

fied forms will result by simplifying the lines beneath. This will also be found helpful in simplifying the completed designs. They often contain more lines than are needed and without which they would show better taste.

Tracing paper will be found very helpful, also, in correcting students' drawings in the following manner: When a drawing has been brought up for criticism lay a piece of clean tracing paper over it and draw, keeping as much of the student's original as possible, while making a better design. Sometimes a slight change and a great deal of elimination will turn the average design into a really creditable one. The student oftentimes will respond with great interest in watching this and will be encouraged to see the possibilities of his crude design. Only, don't give him the tracing. Keep it, and ten to one in a few minutes he'll be back again to the desk with a request for another look at it. Grant it, for he will really look at it and absorb it more thoroly than if it were handed over to him.

These tracings, if kept, accumulate rapidly. Some of them will deserve enlarging on big sheets to be kept as examples to show the class. No teacher ever had too many such sheets, not only sheets showing finished designs but more especially large sheets of design material, raw material from which designs can be originated, such as the first sheet shown here. This sheet can be easily enlarged for class use.

Actually a great number of these sheets are necessary. Students cannot be expected to carry a fund of this material in their heads. The instructor must supply it in some way. It is as necessary as having a lumber pile in the carpentry shop and like the lumber the natural forms as found in nature must be sawed and planed and sandpapered and stained before it is suitable for decorative purposes indoors. When furniture is made of wood with the bark on it is made for out-of-doors use. Indoors it would be out of place. Refined taste demands somewhat the same of natural forms as used in decorative design. The dog is a conventionalized wolf and is obviously more suitable for man's company than his snarling ancestor.

Record Forms for the Mechanic Arts Department

Used in the Technical Building, Salt Lake City, Utah. G. A. Raeth, Supervisor

THE introduction of the "tool check" was found necessary for the reason that some of the shop instructors had formed the habit of loaning tools to other teachers in the technical building or to teachers of other classrooms, without making a record of the same. The result was that the shop teachers forgot to whom they loaned tools, and the ones doing the borrowing would forget to return them. The loss of tools from this cause became serious and the use of the "tool check" was of necessity introduced.

The "tool check" calls for the date on which a tool is borrowed; the name of the instructor from whom the tool is borrowed; the name of the tool borrowed; and the name of the individual doing the borrowing. Upon return of the tool, the date is recorded and the signature of the instructor from whom the tool was borrowed and finally returned, is affixed.

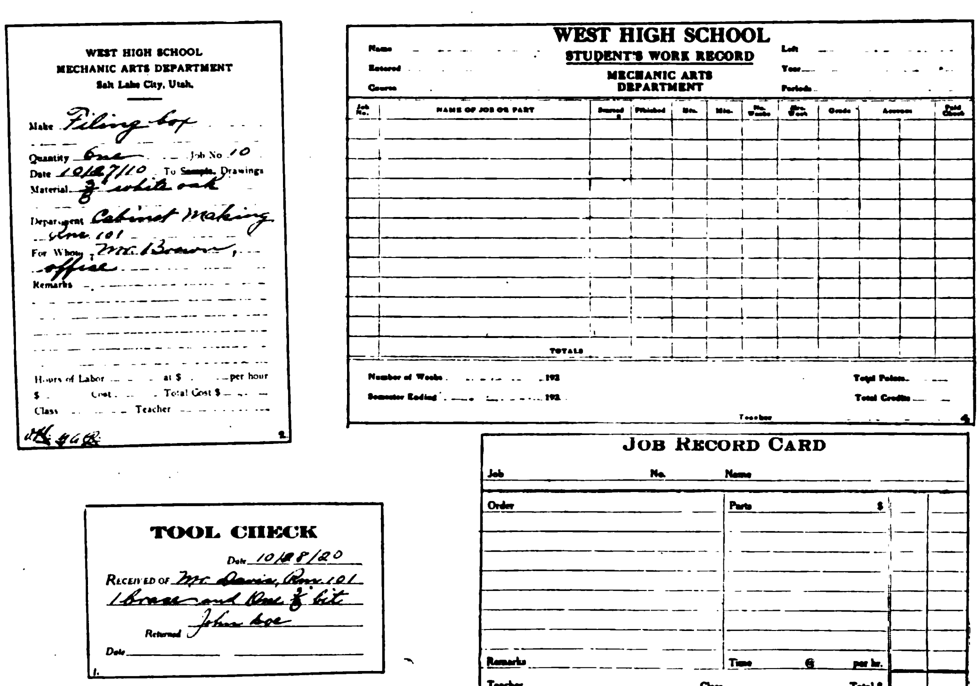


FIG. 1.—FORM FOR TOOL CHECK. FIG. 2.—WORK ORDER. FIG. 3.—JOB RECORD CARD.
FIG. 4.—STUDENT'S WORK RECORD.

It often happens that it is necessary to make repairs in another shop, to have a piece of work done for some other classroom or teacher. This was often done without good reason or the necessity for such a job. There was no record kept of such work, the kind and amount of material used, and of its relative value. This resulted in a careless use of materials and the making of things that were entirely unnecessary. All such orders are now made out in the office of the technical building by the supervisor in charge. These work orders are made in duplicate, one copy of which is kept in the office and the second is given to the teacher whose class is to do the particular job called for. Thus no piece of work may be done in any classroom or shop without an order from the supervisor's office. See Fig. 2.

The "job record card" is used in the automobile mechanics classes. These forms contain detailed information on repairs done on cars for individuals who bring them to our automobile shop classes. These record cards come in triplicate. One is sent to the office, another is given to the owner of the car and the third copy is kept on file by the class teacher. See Fig. 3.

The use of the "students' work record" (Fig. 4) contains a detailed record of the work done by a student during a certain period of weeks or a semester. These records are kept by the students themselves with the assistance of the teacher in charge. The same are made out in duplicate; one copy is kept by the class teacher and the second is turned in to the office. The "student's work record" sheets are handy reference of all work done by individual students.

COLLECTIONS

Month Ending ____________

Teacher ____________

Class Per.	For What	Amount Collected	From other sources or individuals	Amount Collected

FIG. 6. RECORD OF COLLECTIONS.

MECHANICS ARTS REPORT

Month Ending ____________

Teacher ____________

Periods	Subject	Class	No. enrolled	Individual problems done or made	Things done for other classrooms or the school or others	Value

FIG. 5. TEACHER'S REPORT OF WORK DONE BY STUDENTS.

The instructors of the mechanic-arts department were asked to make a short report of the work done in their classrooms each month and also of the collections made. It developed that such a thing had not been done before and some of the instructors were at a loss just how such reports were to be made. For their convenience forms as shown in Fig. 5 and Fig. 6 were mimeographed.

Administrators have always recognized the value of keeping records of some sort. They give ready and definite information of things of vital importance to their department; they promote thrift and co-operation and are a means whereby systematic reports may be made to the superintendent's office or school board.

UTAH'S PART-TIME LAW OF 1919

Francis W. Kirkham, State Director of Vocational Education

"At the last session of its Legislature the State of Utah inaugurated what I regard as a model compulsory part-time education law. Under the wise leadership of its State Department, and with the cooperation of the schoolmen of the state, the bare text of this law has been made into a comprehensive program for the conservation of children not equaled on this continent. In this way Utah has not only taken a foremost place in the galaxy of states but has made a distinct and lasting contribution to citizenship, efficiency, prosperity and civilization."—Dr. C. A. Prosser, director, the William Hood Dunwoody Industrial Institute, Minneapolis, Minn., formerly federal director for vocational education.

"Utah is the only state that has attempted to eliminate idleness from twelve to eighteen thru the public school system. No other state is within hailing distance of Utah in an efficient attempt to solve the civic, industrial and educational problems from 12 to 18."—Dr. A. E. Winship, editor Journal of Education, Boston, Mass.

The Utah Educational Law of 1919, referred to in the above quotations, is unique in two features. First, it requires all children to 18 years to attend a public or private school for thirty weeks, with this exception, that pupils who have finished the eighth grade or who have reached 16 years of age may be excused by the district or city superintendent to enter employment provided they attend a part-time school at least 144 hours. Second, it provides for year-round educational training in health, vocations, and civic and patriotic service.

Just what does this new law mean and how does it work in reference to its first provision?

First, the law clearly aims to eliminate idleness by requiring the pupil to be either at school or at work and for this purpose every child in Utah is required to register once a year with school officials. This registration is closely checked with the annual school census. Second, the law directs the attention of educators to the

necessity of making the working time an educational time for the pupil. Otherwise, the boys at work will not receive a square deal in educational opportunities or in the expenditure of public educational funds.

The first noted result came in the very large increase in the enrollment of boys and girls in the regular junior and senior high schools, amounting to 40 per cent increase for all the high schools of the state in the first year. These boys and girls who had already entered employment decided to go to school all the time as they had to attend school part of the time. Moreover, the law popularized education, for everybody went to school and loafing by minors under eighteen on the public streets automatically ceased. The second outstanding result was the demand which these young people made upon the schools. Clearly, this group of young people needed educational opportunities and facilities to prepare them to more efficiently meet the immediate problems of their lives—mainly vocational education and training for good citizenship.

Courses in English, science and mathematics designed primarily to prepare for the professions or for entrance requirements to college were not selected. School boards were therefore obliged to provide for increased facilities in farm mechanics, in agriculture, and in other vocational courses and more practical and less technical courses in English and mathematics. Opportunities in recreation and clean sport were called for and where these demands were met by principals of high schools, the high school became the great popular social center of the community. Glorify to his companions one thing in which a boy excels and he will devote himself to other things which you offer for his advancement.

The misgivings and apprehensions of school administrators in the difficulties they expected did not materialize except in a limited degree. For example, smaller high schools in the more sparsely settled districts provided for the increased attendance in regular classes with but small, if any, additional expense. A very considerable portion of the farm boys attended school for from four to six months. Courses in agriculture and community civics were adjusted to care for these pupils by teaching the subject matter in units. Also, high schools organized their courses on the four-quarter system. A very few boys and girls in these smaller towns entered regular classes for part-time. Provo is a city of eight thousand people and yet the records for this year show there are only 61 part-time pupils, and generally they attend a regular school class.

A careful study is being made this year of attendance in which the following items are being reported upon by the school districts: Enrollment in grade schools, junior high schools, senior high schools, part-time pupils in regular schools, special part-time classes, and short-unit courses. This enrollment is checked with the annual census and pupils moving into the district and out of the district are accounted for.

Tabulation is also being made for the different forms of excuses permitted under the law. Reports have been received at the state office for about one-third of the districts. On an average about three per cent of the school census is unaccounted for. The enrollment in the high school continues to increase very materially this year. In some cases the growth is phenomenal. For example, two years ago the South Cache high school enrolled 125 pupils; this year it has enrolled 350. The Jordan school district has doubled its enrollment from 350 to 700 in two years. The writer was told recently that in the Nebo district in the high school of a city containing about 3,500 that 200 pupils will enter high school next year with a graduating class this year of 28.

In general, about fifteen to seventeen per cent of the entire school population in Utah attend high school. The twelve districts reporting show a total of 36,493 school census, 23,808 attend grade school; 5,707, junior high schools; 3,202, senior high schools; 2,214 other schools in the district, namely, private schools; 414 attend schools out of the district; or a total of 35,345 attending full time schools. Two hundred and sixty-eight attend regular school for part time; 380 attend special part-time classes; 76 attend short unit courses; or a total of 724 attending part-time schools; or a total of 36,069 attending full-time and part-time schools. In this same group there are 328 who have reached eighteen years since August 1st; 52 have married; 153 are excused on account of illness, and 151 live beyond a 2½ mile school limit where no transportation is furnished, and 143 are excused for other purposes. These figures added to the number of those moved into the district and moved out of the district leave from one to three per cent only of the school population unaccounted for.

The citizens and the school people of the state believe in our new laws and are determined upon their administration. Much is yet to be accomplished. At the Utah State Fair in a special exhibit which occupied a large room the following slogan was displayed: "Utah's educational program provides year-round training in health, citizenship, vocations, arts and recreation, emphasizes knowing and doing, instruction and achievement."

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

NO PLACE FOR ANTAGONISM.

COMPLAINTS are already coming in from teachers to the effect that some administrative officers—supervisors, principals, or superintendents—have assumed an attitude of hostility toward them with the evident purpose of getting rid of them.

This is a strange indictment. We wonder if there are such people in responsible positions. We wonder also if people in such responsible positions are not frequently under great provocation. There are usually two sides to such controversies.

But why should there be personal controversies in purely professional matters? Very few people are able to do their work with absolute perfection, especially from the standpoint of the expert overseer. But this is not an occasion for hostility; it's an occasion for kindly and effective criticism. Such criticism should be freely offered by supervisory officials, and just as freely and kindly received by the teachers. There would seem to be no occasion for personal bitterness in such a proceeding, if both sides are actuated by the right motives.

If a teacher fails in his work it is the duty as well as the privilege of the supervisor or administrator to render every possible assistance in the way of advice, criticism, and suggestion, in helping such teacher to overcome his difficulties and to retrieve himself from his failures. There are supervisors who proudly relate how they have helped a failing or mediocre teacher to become a superior one.

But assuming the failure to be complete and irretrievable, there is yet no occasion for hostility or unhappy personal relations. A supervisor usually tells a failing teacher with kindness and with reluctance that he is failing and that it seems advisable to let him go at the end of the year. No fair-minded teacher should resent this. He should recognize it as the supervisor's duty.

The proper thing to do in all such matters is to deal always on a professional basis, to recognize the rights of all concerned, to deal justly with all interests involved, and to leave as far as possible all personal feelings and considerations out of the decisions which justice demands.

STILL OPPORTUNITIES IN TEACHING.

AFTER the great agitation concerning the inadequacy of teachers' salaries (the methods of which were not always wise nor the results desirable), the teacher's business has steadily gained both in standard and in desirability.

Even the salary question has changed very materially. The medium salaries for both men and women in standard high schools in Illinois have increased over $400 the last year. This increase will probably be equaled or exceeded in many other states. The readjustments in matters of taxation, salary schedules, etc., have merely begun. The next few years should witness a striking growth of the spirit of liberality, or at least of justice, toward the teachers.

Even at the present time, young men with two years of preparation above high school in the field of industrial arts can secure teaching positions that equal or exceed even in point of salary any other work which they can enter.

Besides the salary inducement, there are many other attractive considerations in connection with the teacher's work. Especially in the field of industrial education there are developing many avenues to desirable employment both in and out of the school. Proper training in this field puts one on the eligible list for entrance into these desirable lines of work.

While we are discussing vocational guidance, is it not fair that promising young men just graduating from high school should be informed concerning the opportunities for service and success in this particular field of educational work? The criticisms of the teacher's tasks and opportunities have been grossly overdone. Is it not time now to emphasize the other side and to call for recruits among competent young men?

INDUSTRIAL ARTS AND THE PART-TIME SCHOOL.

SOME manual or industrial arts teachers are still disturbed by the fear that in some way vocational work and the part-time school endanger their work.

So far as vocational education is concerned, it deals with a different group and in a different manner from the group and manner with which industrial arts are concerned.

The shop work in the general continuation courses of the part-time school is nothing more or less than a good grade of the right kind of manual or industrial arts. When properly handled, such work may become the very center of interest in the part-time continuation work.

Instead of feeling discouraged over the outlook, the manual or industrial arts teacher is now in a position to render an indispensable service to the part-time continuation school. If he is properly prepared (and such preparation presupposes some trade experience), such a teacher will find abundant opportunities both in the part-time and the junior high school for interesting work and steady advancement. If he has not had actual contact with trade work, he should lose no time in getting it. Evenings, Saturdays, and summers may very profitably be spent in gaining experience in the industrial shops.

There is more encouragement now for the manual and industrial teachers than ever before, and they should prepare themselves to take full advantage of it.

UNCOVERING TALENT

The School Art League of New York is doing admirable work in discovering and developing the artistic talents of gifted pupils from the high schools of the city.

Guidance of artistic talent is a more responsible undertaking than guidance in vocational work that requires mechanical skill. Indeed the more one becomes interested in artistic performance and in artistic products, the less confidence he may have in his judgment of artistic talent. Art applies to such a variety of effects and purposes that no one person can presume to judge them all, without realizing that his standards are either arbitrary or uncertain.

Marked ability in drawing, modeling or painting does not indicate more than technical skill. Each effort in artistic performance is an experiment the result of which may not be determined at once and finally. So art becomes the most difficult element in human production to pass judgment on and to become sponsor for.

We recall the assertion of one teacher of design: "The worst I can say of your design is that it is commonplace."

We must agree with the assertion that Art is never commonplace.

We also agree that Art expresses emotion and creates emotion in those who see it. Art is beautiful.

With evidence of ability to produce exceptional and beautiful results in design the teacher may well encourage a high school pupil by every means possible to bring his talents to bear on some definite problems in design. Here again the teacher must be decisive but not altogether arbitrary. Every artist is successful in a certain limited field because his interests and emotions lie within a limited range of human activity. Each student will be successful in design according to his interest and emotional response to the problem with which he works. The high school student is not established in taste however and should be constantly subjected to new experiences.

Unlike the professional artist who has accumulated definite material and acquired definite understanding, the youth has much to learn and unlearn. We doubt the judgment of bringing the artistic bent of a high school pupil to bear on one narrow line of production to the neglect of study that will develop the whole conception.

The guidance of artistic talent must not be made purely vocational guidance. Talent must be uncovered that it may grow and be developed by careful nourishment.

THE OLD TEACHER

There are times of reaction in the lives of conscientious servants of humanity when they feel that years of service have been rendered in vain. After all, what is the use of this continuous daily grind of classroom, shop or office when so little direct results are in evidence! Then comes a rift in the clouds of despair that sets the heart aright. A breath of fresh encouragement is taken which fills the lungs with vigor, and the ambitious energy of the teacher is regained.

Fortunately these reviving experiences come to the old teacher and are so convincing that they cannot be denied. The old teacher meets for the first time in years one of his pupils who went out so apparently weak in the essentials of successful living, and finds him strong and successful. Surely, thinks the old teacher, this is no work of mine; this fellow has succeeded in spite of my instruction. But as he observes the nature of this success it is evident that it is supported by the conceptions and ideals of the classroom. This job must be done right for the sake of right doing. It must be done by me with as little direct help as possible. It is not of great immediate value but is part of a great purpose to succeed. It is *the job at hand,* and that is purpose enough.

When the teacher recalls that this one precept of doing the thing at hand in the best possible way has always been emphasized to his classes, he may take upon himself some credit for successful accomplishment on the part of his pupils. The greatest project ever conceived by a teacher and the most essential one is the building of a strong, reliant character. The school subject is incidental.

THE PROJECT IDEA AND THE INDUSTRIAL ARTS.

The most prominent and important movement now in elementary and some phases of secondary education is the attempt to work out a satisfactory curriculum on the project basis. The Project very clearly holds the center of the stage. It would seem to be a necessary part of any satisfactory solution of the course of study and curriculum problem.

When one comes to think about it, manual training, industrial arts, and vocational work are the really genuine, original, and perfectly consistent project subjects. They set a real, purposive task to be accomplished. In the accomplishing of the task, various and sundry pieces of information, questions for investigation, methods of procedure, and problems of drawing and computation arise as a necessary part of the work. This is the very essence of the project idea so widely exploited now by educators in various fields of work.

It is interesting to note that the manual training teacher of twenty-five years ago used in a limited way the project idea and even had some conception of the bigger notion as it is now conceived. So the world do move, after all, but we are rather disposed to think that at least in some ways the unassuming worker in the school shop has been riding in the van of the movement.

There is still much to be done to perfect the work of the industrial arts on the lines of the broadly conceived project idea. But in this direction lies the road to richer and fuller significance for the work.

Vocational and Educational Guidance in Erie, Pa.

The Work of Mr. H. E. Stone, Boys' Counsellor.

Vocational guidance has become an integral part of the instruction offered in the Central High School at Erie, Pa., and the work, which was initiated a year ago, has been considerably broadened during the present scholastic year. The department is in charge of Mr. H. E. Stone. In a recent discussion of his work, Mr. Stone writes:

"The idea of vocational and educational assistance to young people appeals to all thinking men and women. A large proportion of Erie boys and girls leave school for work as soon as the law allows. They have talents which need to be conserved.

"More than two thousand occupations are bidding for their service. Shall they go out into the world without guidance to add to the number of misfits who will some day seek to "get even" with society for its neglect? Or shall they be given information about themselves and the world in which they are to live and work, about occupations and opportunities for advancement, thru home study, night schools, correspondence courses, etc.?

"Shall they be led to think in terms of their own abilities, interests and aptitudes? Or shall they be shoved ruthlessly into blind-alley jobs by an educational system too long forgetful of the right of every child in a democracy to equality of educational opportunity?

"Hundreds of cities, including Erie, have at last recognized the responsibility of the schools in preventing at least some failures in life, thru occupational and educational counsel that will reduce the number of misfits.

"And what of those who enter and will complete the senior high school? Is it not important that they enter the right school and pursue the right courses of study impelled by an interest born of the 'life career motive'?

"English is the only required subject in most senior high schools today, and wisely so. The preparation needed by future doctors, salesmen, electrical engineers and machinists differs widely. Furthermore, each student has his own distinctive qualities and abilities. It is fortunate, therefore, that each student in the high schools will have special help in adjusting himself to the right course of study and to the right life aims.

"There was a time when the high school enrollment in Erie was small and the free elective system did not exist. The need for scientific, vocational and educational guidance was not then so great.

"Today the situation is quite different. Our high schools are democratic. They are being adjusted to meet the needs of all the children of all the people. They are acknowledging their obligation to recognize the vast individual differences that exist among secondary school pupils.

"The high school principal who once gave time to the educational guidance of the talented few finds himself confronted with new problems. He lacks both the time and the special training needed for scientific guidance of boys and girls on occupational questions. If successful in improving the quality of instruction in his school, he finds himself busy with problems of supervision. For this reason the principal of broad educational vision welcomes the trained counsellor. He is fully cognizant of the fact that successful guidance depends on close contact with schools, parents, teachers, pupils, employers, business and the multitude of possible occupations. All this calls for the specialist to whom fathers and mothers may turn often for advice and help concerning their children's future."

Aims of the Vocation Bureau.

The immediate aims of Mr. Stone's work as outlined by him are:

1. To maintain a clearing house for facts on life careers.
2. To publish occupational facts for the guidance and help of pupils and their parents.
3. To develop closer co-operation between schools and occupations.
4. To assist the young people of Erie in choosing, preparing for and advancing in an intelligently chosen life work.
5. To study into and assist in the prevention of waste in the preparation of our boys and girls for their life careers.

Facts for Prospective Sheet Metal Workers.

In furthering the second purpose of the bureau, Mr. Stone has published a number of outlines on several trades and occupations. The following facts for prospective sheet metal workers is a typical outline which has been prepared and placed in the hands of each boy:

1. The age of effective entrance into the sheet metal trade is from 16 to 19 years.
2. Formal apprenticeship does not exist in the sheet metal trade.
3. Most shops arrange the work so that sheet metal workers will work both in the shop and out on jobs.
4. The work of the sheet metal trade is not so monotonous as that in some trades because of the variety of the work done.
5. Workers in the sheet metal trade work an eight-hour day, with time and a half for overtime and double pay for Sunday work.
6. Sheet metal workers who can do expert work make from 80 to 95 cents per hour (1920). Helpers begin at from 30 to 40 cents per hour (1920), their pay increasing while they are learning until the maximum wage is reached.
7. The sheet metal trade can be learned in from two to three years.
8. Sheet metal workers work in copper, sheet iron, tin, galvanized iron and in all sheet metals.
9. Sheet metal workers put on metal ceilings and tin roofs, they hang cornices and gutters. They make cylinder jackets, crank shields, guards for machinery, bread pans, cake pans, etc.
10. Sheet metal workers need to do much figuring. A good knowledge of arithmetic is therefore esential. They must be able to read blueprints and to lay out work if they hope to be promoted.
11. Many sheet metal workers read and study at night, thereby becoming more proficient in the trade and in some instances advancing to foremen. More than forty sheet metal students have recently taken the free night school courses in sheet metal drafting and design.
12. The National Correspondence School of St. Louis offers a correspondence course that has been taken and recommended by some Erie sheet metal workers.
13. Erie sheet metal foremen report that there is a shortage in this trade (1920). They express surprise that more young men do not enter it.
14. Erie sheet metal concerns prefer young men who have taken the sheet metal trade course offered in the schools.
15. If you are interested in the sheet metal trade, why not talk it over with some sheet metal workers, visit some of Erie's sheet metal concerns and then consult the boys' counselor with a view to taking the trade course?

Facts for Prospective Electrical Workers.

The following are facts for prospective electrical workers:

1. The electrical trades include:
   a. The manufacture and repair of electrical equipment such as generators, motors, telephones and switchboards.

JOB ANALYSIS CLASS, BANGOR, ME.

Front Row (Left to Right): A. B. Hayes, Director of Mechanic Arts; Miss Theresa Pietto, Miss Ethel E. Harrigan, Director of Domestic Science; Miss Ruth Crosby, Mr. Otis H. Ginn.

Second Row: T. C. Morrill, Superintendent of Schools; E. K. Jenkins, State Supervisor; C. A. Noyes, P. M. Williams, C. E. Holyoke, Leyland Whipple.

This class has been organized thru the cooperation of Director A. O. Thomas, State Superintendent of Schools, and Superintendent T. C. Morrill of Bangor. It is conducted by Mr. E. K. Jenkins, State Supervisor of Trades and Industries for the State of Maine.

The course aims to give teachers a working knowledge for analyzing jobs and for organizing the material so that students in vocational courses may receive a maximum amount of information in the minimum amount of time.

b. The installation of wiring systems for lighting, heating, power communication and signals.

c. Outside wiring for the transmission of power street lighting, etc.

d. Power station maintenance and operation.

2. The manufacture of electrical equipment includes many highly specialized occupations of which armature winding may be taken as an example.

3. Those interested in the manufacturing of electrical equipment will do well to visit the plant of some great electric company before deciding to specialize in electricity.

4. The boy who chooses inside wiring as an occupation must learn the various methods of installing electric wires and conduits. He will need also considerable specialized knowledge of the theory of electricity and a working knowledge of the electrical code governing the installation of wires in buildings to be insured against fire.

5. To be a success as an inside wireman one must have some skill in the use of the hands. Soldering torch, brace and bits, screw driver, connectors and pliers must all be used in the installation of wiring systems. The hand skill required is not as great as in the toolmaker and pattern maker trades.

6. The work of the inside wireman is one of the most healthful of the building trades. There is no heavy lifting, no dangerous machinery, etc.

7. While the work of the inside wireman is not dangerous, that of the outside wireman is highly hazardous. High voltage transmission lines demand extreme care on the part of the worker.

8. The working day of the inside wireman is generally eight hours.

9. Electrical workers in factories generally work nine or ten hours per day.

10. An electrician needs some practical mathematics. He ought also to study electricity and magnetism, mechanical drawing, architectural drawing, etc.

11. Both practice and theory are necessary for success in electrical work.

12. Some electricians and many electrical companies run supply and fixture stores along with the practice of their trade.

13. Electrical contracting, the selling of electrical fixtures and work as a practical electrician are possible opportunities open to those who have learned the electrician's trade. The electrical designer and the sales engineer need higher and more technical education.

14. There are few apprentices in the electrical trade. Boys begin as helpers. In the great electrical companies, however, contract apprenticeship courses are offered to young men who are ambitious to become electrical engineers or high grade workers in the plant.

15. Why not learn much about many occupations before choosing your life work?

16. A two-year unit trade course for electricians is maintained at Academy High School.

17. The entrance requirements to the two-year unit trade course for electricians at Academy High School are: Fourteen years or more of age and ability to profit by the instruction offered.

18. Those who complete the two-year unit trade course for electricians at Academy High School may be admitted to the senior high school. This is necessary if preparation for the engineering department of a university is desired.

A POINT IN TEACHING MANUAL TRAINING.

To the Editors:

In the shop organization, details such as preparing materials, etc., seem to so monopolize the time of the average teacher that he has time to consider only his finished product. Or perhaps he feels that he must put his time on this phase of the work in order to have something to show the public for the money it has put into shop equipment.

In some cases, however, he is not getting what he is working so hard for, because he is overlooking some very important points. I have met many men, for instance, who are having difficulty in putting over their work in the beginning sixth grade. In a great many cases, they are starting work with the jack plane at this time—starting with a small project, but with one which requires formal work in planing to a line and squaring stock. In my estimation, the men whom I have met are falling down on this point. They are not making an analysis of the job before starting work. They have not clearly in their own minds the several detailed operations involved in the big job. How can they expect to impart that which they do not possess? Would it not be better, if there are too many details involved in the job, to pick it apart and put across a few at a time? For instance—with the jack plane—you have the handling (actual movements on wood) of the plane, which is in itself a job, the adjustment of the plane and the formal work of planing to a line and squaring stock. I have the boys first use the plane on a model where they plane to a line, but do not have to actually square up—that is in an informal way.

This gives them the handling and adjustments. That is as much as the average boy can master at one time. Then I follow up with the formal work, actually squaring stock. It seems to me that I get much better results this way.

Would it not be better for us to put a little more time on analysis of the job and thought processes involved in the job and not worry so much about that "finished product"?—*James E. Hopkins,* Supervisor of Industrial Arts, Columbia High School, South Orange, N. J.

THE MANUAL ARTS CONFERENCE.

The conference of specialists in teacher-training, called annually by the Commissioner of Education, met in Indianapolis December 9, 10, 11. As usual, thirty-five or forty men from all parts of the country were present, with an occasional influx from the Indianapolis schools on invitation to hear certain discussions.

Dr. Wm. T. Bawden presided in his annual and usual manner. The program was unusually strong and varied, the distinct emphasis being on the matter of distinct objectives in the various phases of manual and vocational education, the clarifying of certain relations, and the possibilities of standardization and tests of the completeness of the work accomplished.

Among the great mass of excellent material presented, it probably would be fair to point out the contributions made by J. C. Wright of the Federal Board; DeWitte S. Morgan, Indiana University; G. E. Meyers, University of Michigan; R. W. Selvidge, University of Missouri; Ira S. Griffith, University of Wisconsin; Edwin A. Lee, University of Indiana, and D. J. McDonald, University of Cincinnati. Quite equal in importance were the summaries presented by Prof. Chas. A. Bennett, George F. Buxton, and E. L. Usry.

The whole Conference was voted a most enjoyable and valuable meeting. Having tied between Bradley Institute and Michigan University as to the meeting place for next year, the Conference instructed Dr. Bawden to use his discretion in the selection.

THE ILLINOIS MANUAL ARTS ASSOCIATION.

For the first time since the war, the Illinois Manual Arts Association had a kind of get-together meeting at Springfield, December 30. The purpose of the meeting was to decide what the future of the organization should be. It was voted unanimously to revive the Association and to take up the tasks where they were dropped when the war came and took some of the leading members and officials into the service.

This particular meeting was planned chiefly by the former president, L. A. Tuggle of Danville, and Heman J. Barber of Chicago. It was a great success and holds forth the hope that this organization may be as useful in the next twenty years as it has been in the past twenty.

The following program was carried out as planned:

"The Manual Training Teacher—a Professional," A. M. Mercker, Supervisor Manual Training, Quincy, Discussion led by Lewis C. Robey, Principal Morrisonville Community High School.

"Need and Method of Teaching Freehand Drawing in Manual Arts Work," A. B. McCall, Mechanical Drawing Instructor, Springfield.

"Part-Time Schools for Children in Employment," E. A. Wreidt, State Supervisor of Industrial Education, Illinois.

"Continuation Work and Its Relation to Manual Arts," Professor S. J. Vaughn, University of Illinois.

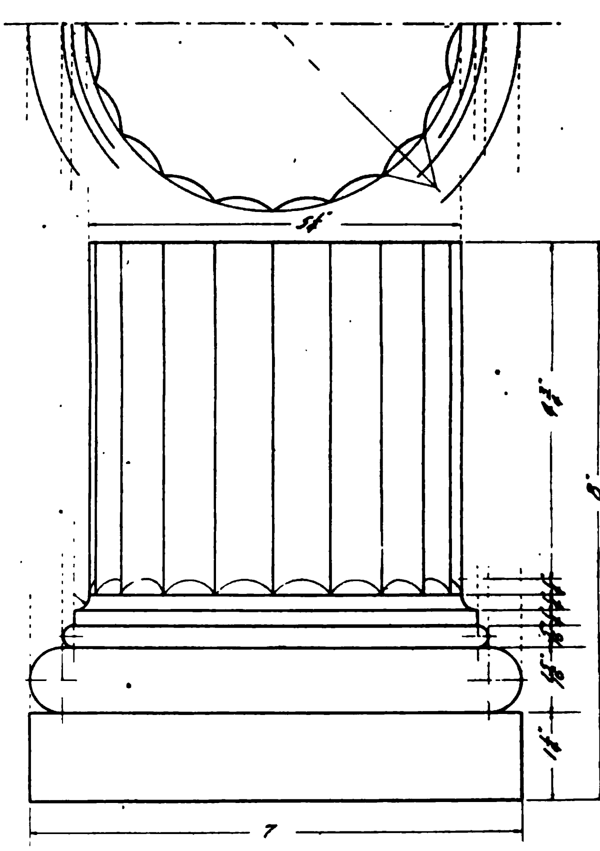
"The Aim of Manual Arts Instruction for Boys of the Junior High School," Charles A. Bennett, Editor "Manual Training Magazine," Peoria.

"The Lesson Plan," Albert F. Seipert, Dean Teachers' Training Course, Bradley Polytechnic Institute, Peoria. Discussion led by L. B. Echols, Quincy High School.

"Class Teaching and Individual Teaching in the Manual Arts," A. C. Newell, Director Manual Arts, Illinois State Normal University, Normal.

"Vocational Rehabilitation of Disabled Soldiers," L. W. Wahlstrom, Federal Board of Vocational Training, Chicago.

The officers for next year are: President, A. F. Siepert, Peoria; Vice-President, A. B. McCall, Springfield; Secretary-Treasurer, A. M. Merker, Quincy.



—DORIC-COLUMN—

FIG. 2. DETAILS OF BOOK ENDS. SEE NEXT PAGE.

TWO PROBLEMS IN WOOD-TURNING

Herman Hjorth, Director of Technical Work, Baldorioty de Castro Graded and Technical School, San Juan, Porto Rico

THE two problems in wood-turning here are somewhat out of the ordinary and suitable only for older boys having had some experience with the lathe.

The two half columns of the Doric Order, shown in the photograph, Fig. 1, were made in the following manner: Two blocks of wood (in this case mahogany) were cut so that each was a little wider than the largest diameter of the column, a little thicker than the largest radius, and about 6″ longer than the total height of the column. One face on each block was smoothed and tried with the other block until perfectly true. They were then bolted together thru the three inches left over on each end. Four 1/4″ bolts were used, the nuts screwed up very tightly, and the projecting ends of the bolts sawed off flush with the nuts. The turning was done in the usual manner, after which the flutes were laid out, Fig. 2, and carved by hand. They were colored with bichromate of potash and French polished.

FIG. 1. COLUMNS FOR BOOK ENDS.

The urn-shaped object shown in the second photograph, Fig. 3, is a knife box of a kind used about 130 years ago. These knife boxes, designed to hold knives, forks and spoons, were used by our forefathers as an ornament on their sideboards, and were often made in pairs, one on each end of the sideboard. This particular knife box, as will be seen from the drawings, Figs. 4 and 5, is designed to hold twelve knives and twelve forks. With regard to the turning it is sug-

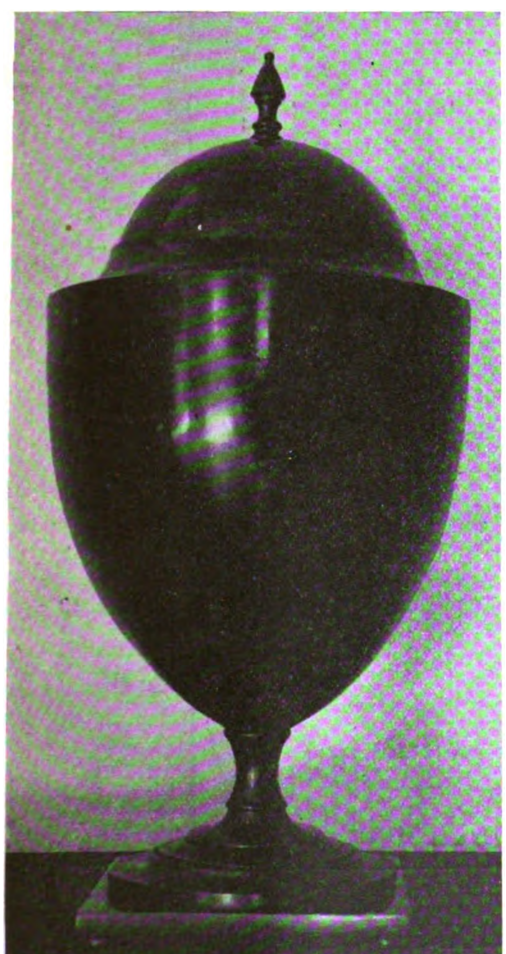


FIG. 3. KNIFE BOX.

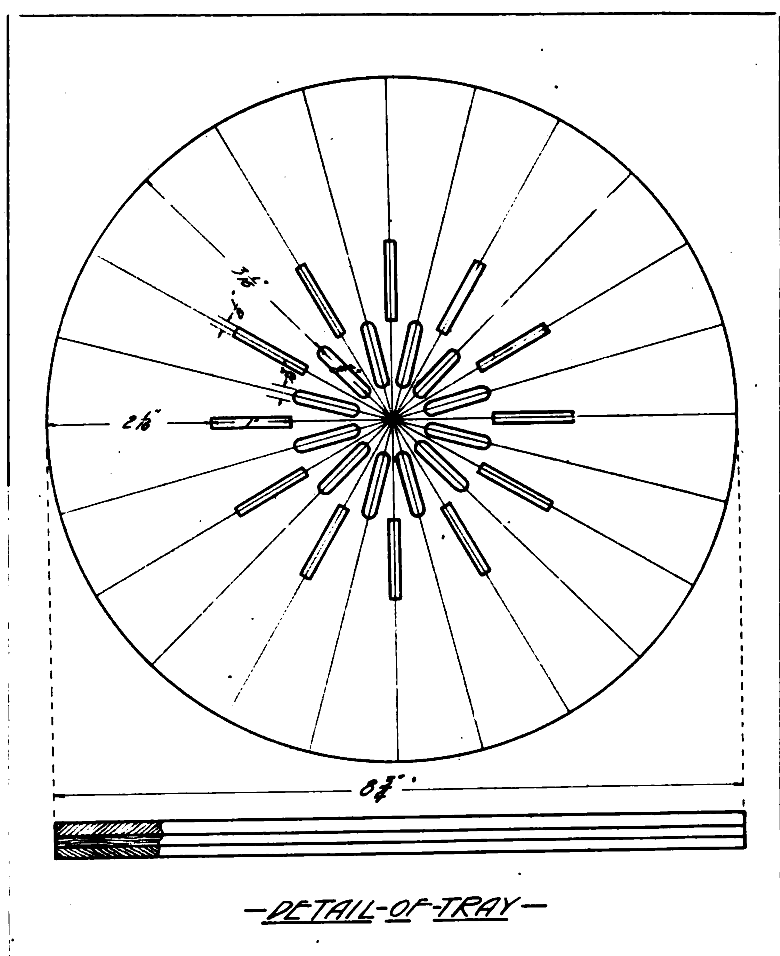


FIG. 4. DETAILS OF TRAY FOR KNIFE BOX.

gested to use the dead center to help steadying the work on account of its weight, and not depend on the face plate alone. When the lower part of this urn was turned, it was gouged out first in order to lighten it, leaving a core by which it could be supported by the dead center. The outside was then cut down to size and the core finally cut away. The lid was turned in a similar manner, after which the two were fitted together, smoothed off and polished, the lower part remaining screwed to the face plate and the center of the lid being held by the dead center. Templates were used in order to get the exact shape. The tray for the knives and forks, Fig. 4, was made of three-ply wood and fitted tightly in place.

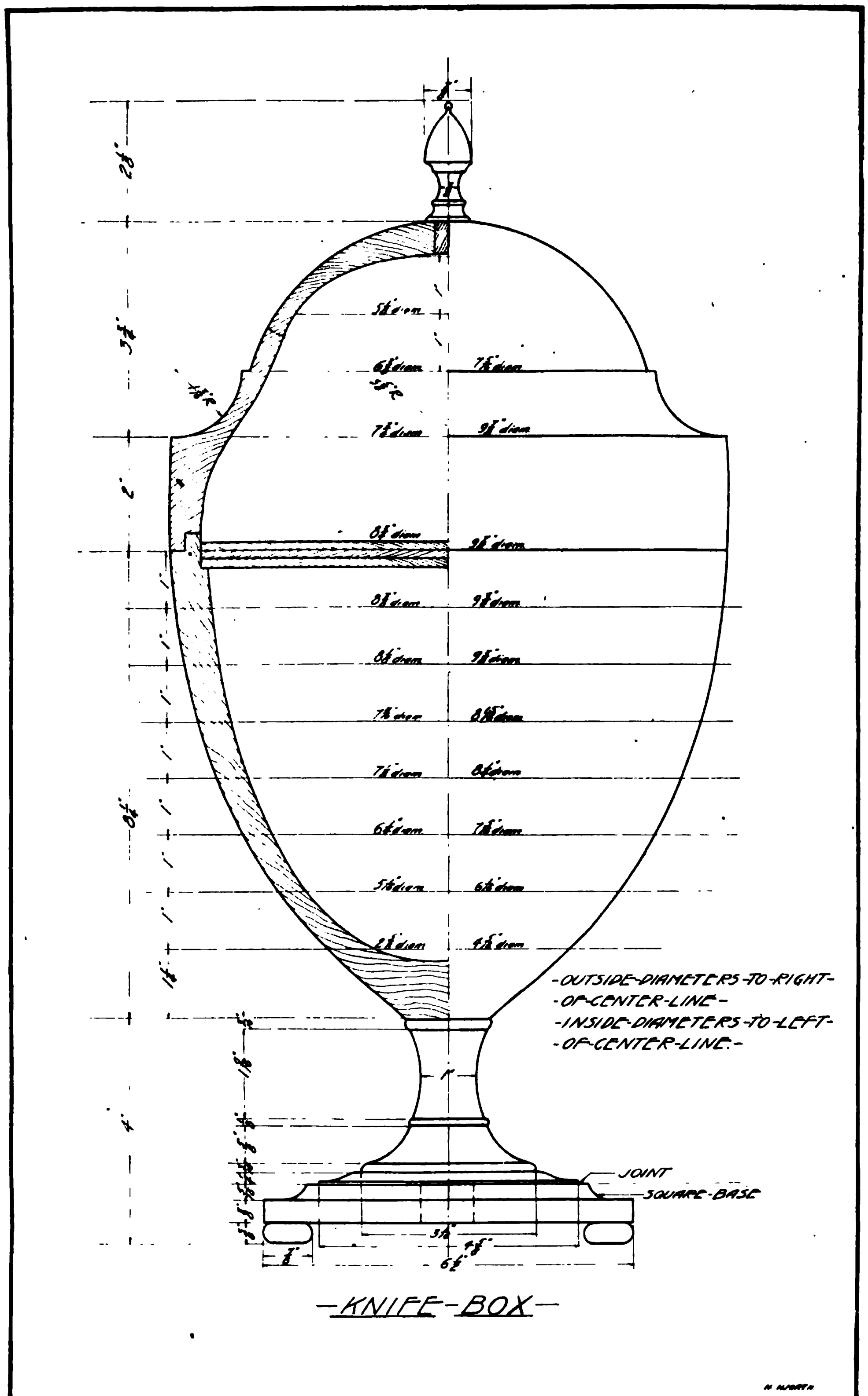


FIG. 6. DETAILS OF KNIFE BOX.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A FERN BOX.

L. M. Klinefelter, Norfolk, Va.

The fern box is an interesting and not especially difficult piece of small furniture to make. It also gives an opportunity to combine caning and sheet metal work with woodwork. The shelf shown may be omitted, but if this is done, particular care should be taken in selecting straight material for sides and ends, so as to avoid a twisted box.

All inside surfaces should be given a protective coat of shellac and the finish in general should be waterproof.

The metal container should be of heavy gauge galvanized iron, slightly smaller than the inside of the box, with soldered seams and a quarter-inch rim around the top. The rim stiffens the container and supports it on the strips run around the top of the box.

THE FERN BOX AS MADE IN THE AUTHOR'S CLASS.

MAKING FLOOR LAMPS ON A SMALL MANUAL TRAINING LATHE.

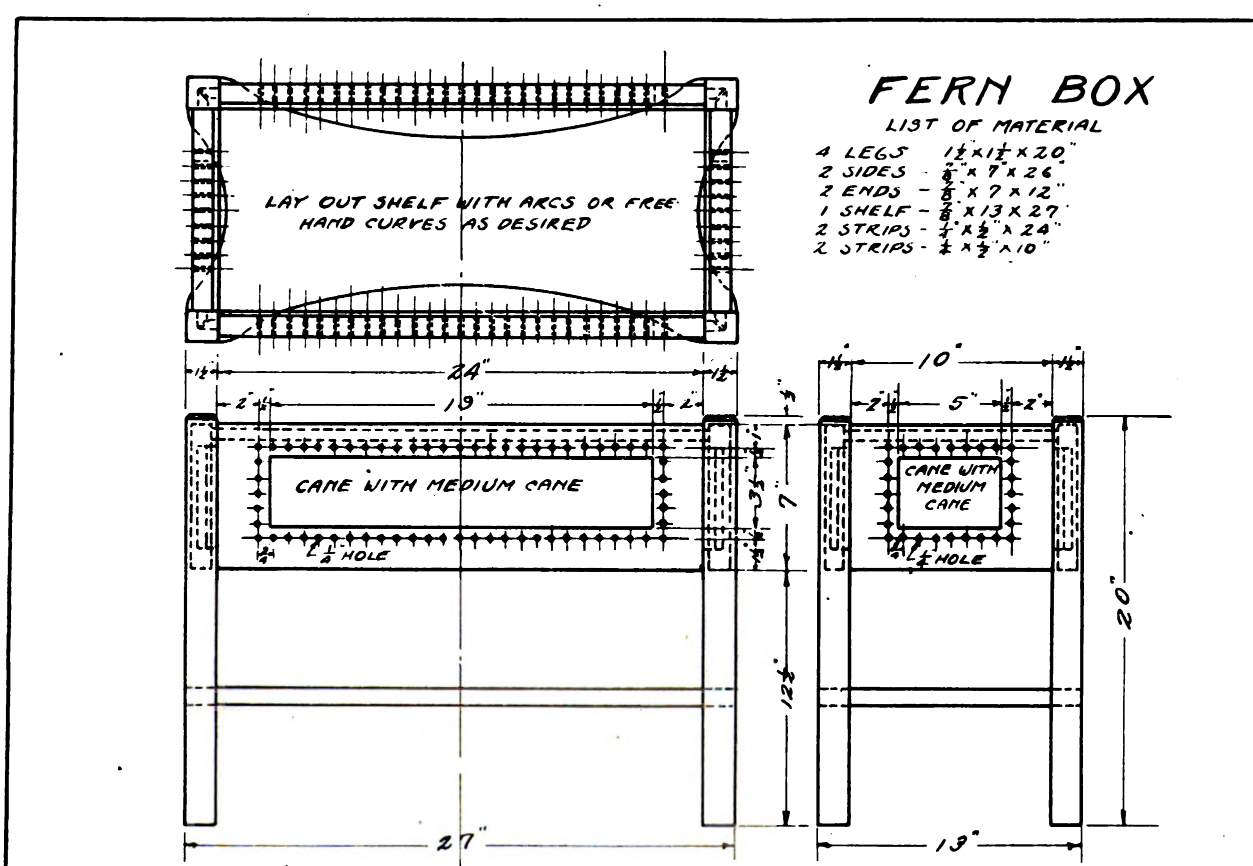
F. J. Phelan, Manual Training Instructor, Collegiate Institute, Galt.

For the benefit of manual training schools that are equipped with small lathes, holding work no longer than four feet, we have prepared this article, showing how floor lamps may be constructed in sections.

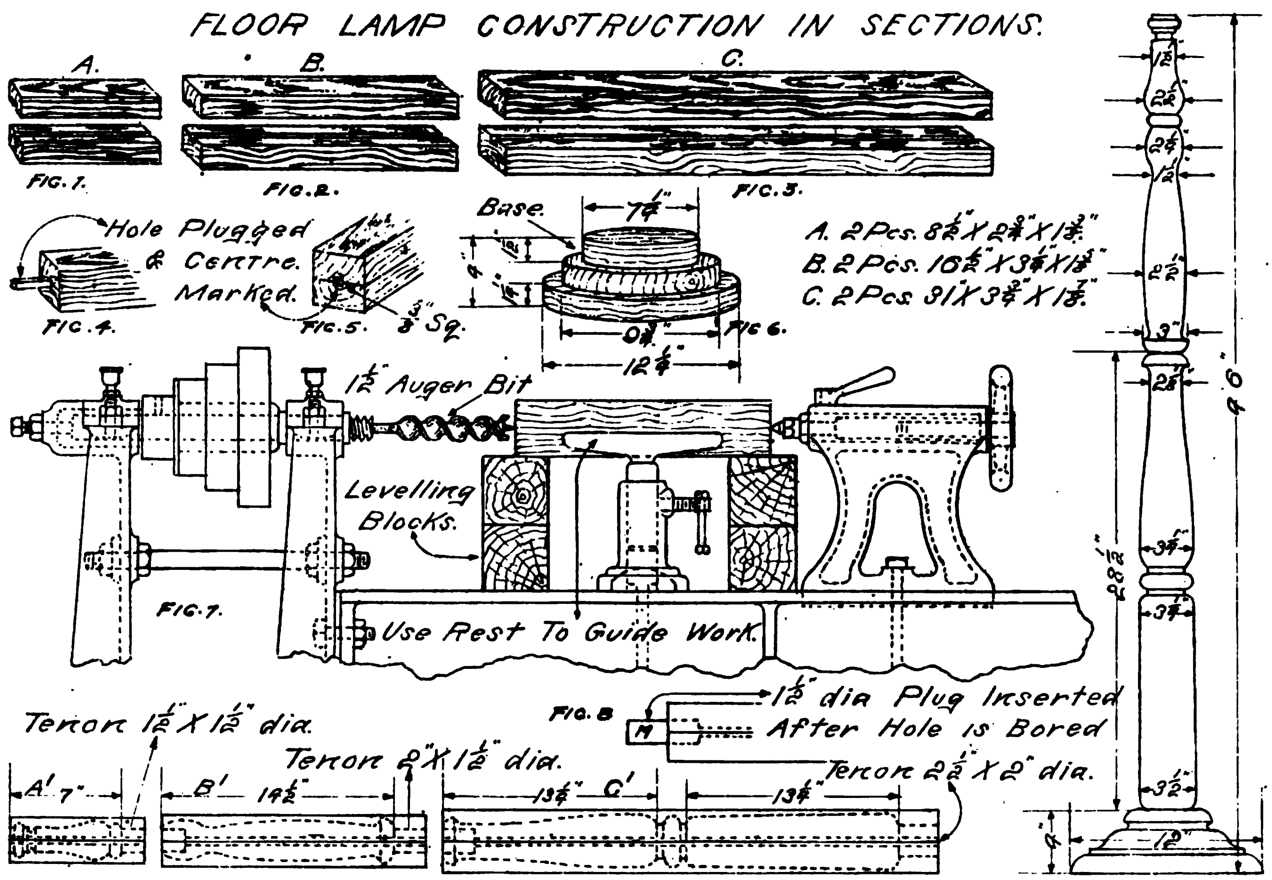
By constructing a lamp in two or three sections, we overcome the difficulty caused by vibration, in turning out long work. We are also able to economize in material, by making use of shorter pieces of wood.

A common objection to this method is the difficulty experienced in fitting the parts together accurately enough to have the complete lamp line up straight. However, by following the details of the work described in the accompanying sketch a surprisingly accurate piece of work may be turned out.

1. Cut to size the stock in sections A, B, and C. Plane a grove 3/8"x3/16" along the center of each, and glue each pair to make the sections.



DETAILS OF FERN BOX.



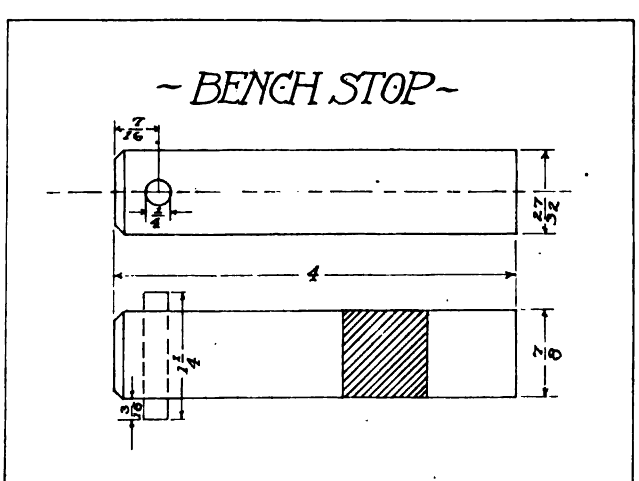
DETAILS FOR TURNING FLOOR LAMPS ON SMALL LATHES.

2. Construct six plugs 3/8"x3/8"x2½", and glue these in the ends (Fig. 4). When dry face off the ends and mark the centers (Fig. 5).

3. Prepare a set of leveling blocks as shown in Fig. 7, so that when placed under each end of the work to be turned, the dead center of the lathe and the center of the bit will be exactly in line horizontally with the center of the work. By lining up the tool rest flush with one side of the work will serve as a guide when boring the hole.

4. The work can be held in position by an assistant, while it is being fed towards the bit, by revolving the wheel of the tail stock. Bore the upper ends of sections A and B, 2½" deep and 1½" in diameter.

5. Turn up a plug 3" long and 1⅜" diameter. The diameter of the end of the plug nearest the live center may be slightly more than 1½".



DETAILS OF BENCH STOP.

6. Insert the plug firmly in the hole bored in the end of one of the sections, about ½" of the plug will project. That end of the plug in which the live center of the lathe has made an impression should be to the outside, so that when the section is placed in the lathe, the live center of the lathe will center in the impression made when the plug was first turned. The idea is to make the plug the true center of the finished work, and to insure proper alignment when the parts of the lamp are fitted together.

7. Sections B and C will be bored at one end and have a tenon turned at the other, 2½" long, 1½" in diameter.

8. After the sections have been turned up and the opening in the center cleared for the wire the parts may be glued together.

9. The base may be built up as in Fig. 6, and shaped and bored on the face plate.

Care must be taken to have the work accurately leveled, and that it is held firmly in position during the boring operation.

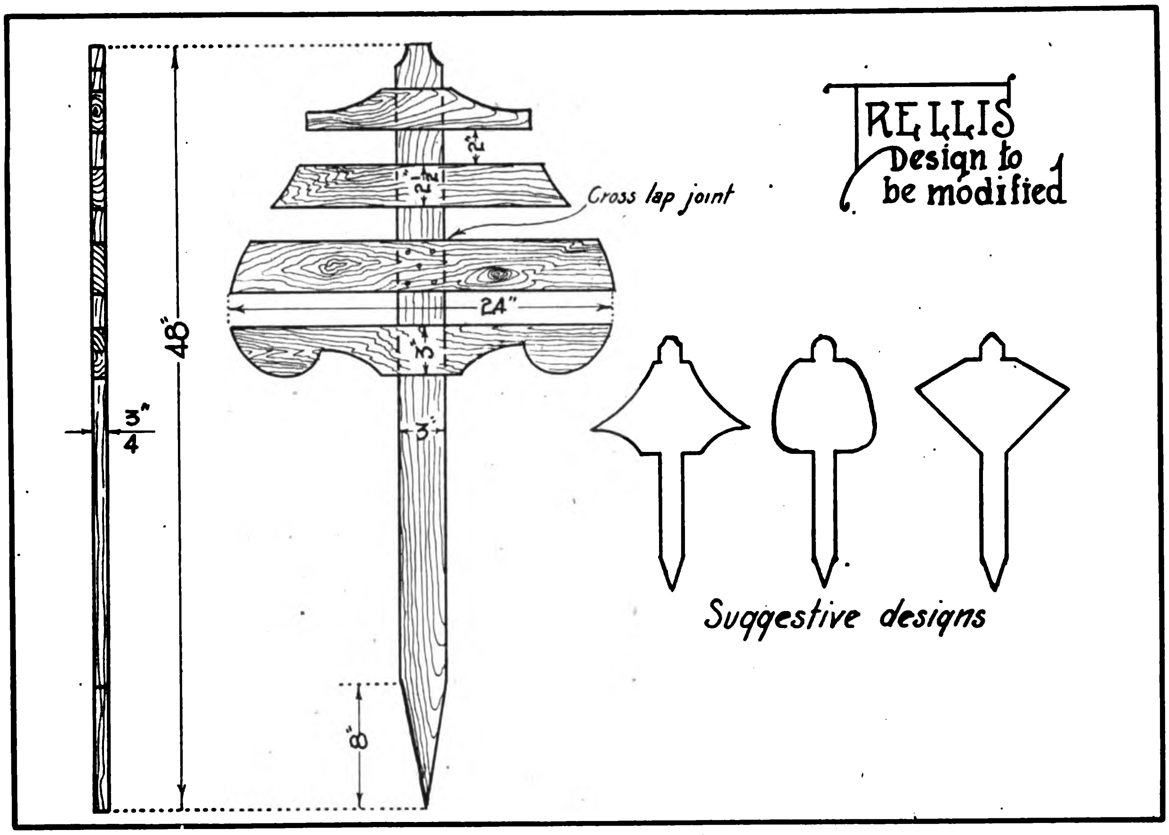
A SERVICEABLE BENCH STOP.

William V. Winslow, North Tonawanda, N. Y.

The drawing illustrates a bench stop which the writer found in use at the high school last year when he undertook his duties at North Tonawanda, N. Y. He presumes it will be new to many teachers as it was to him.

New benches are provided with the necessary stops, but when these are worn or have slipped out on the floor and have been swept out with scrap and shavings other ones must be supplied, preferably of a kind that will not slip out.

Commercial bench stops have their advantages, but for general shop purposes the one here illustrated is satisfactory. It is made of a piece of oak or other hard wood into which is glued a quarter inch dowel. A quantity of these stops should be made up for the purpose of supplying the benches as needed.



DETAILS OF GARDEN TRELLIS AND SUGGESTIONS FOR MODIFYING ITS DESIGN.

A GARDEN TRELLIS.

W. W. White, Waterloo, Ia.

This problem came as the result of a search for something which would involve the cross-lap joint and would give good practice without causing too much loss of time and material if every cut were not perfect.

It is a useful problem in any town where there are gardens and calls for some good judgment in design.

The designs shown were made on folded paper and the cross pieces were gotten out in lengths to fit the designs. In the writer's classes nearly all the lumber was taken from goods boxes.

After the trellises had been completed, they were painted and taken home by the boys.

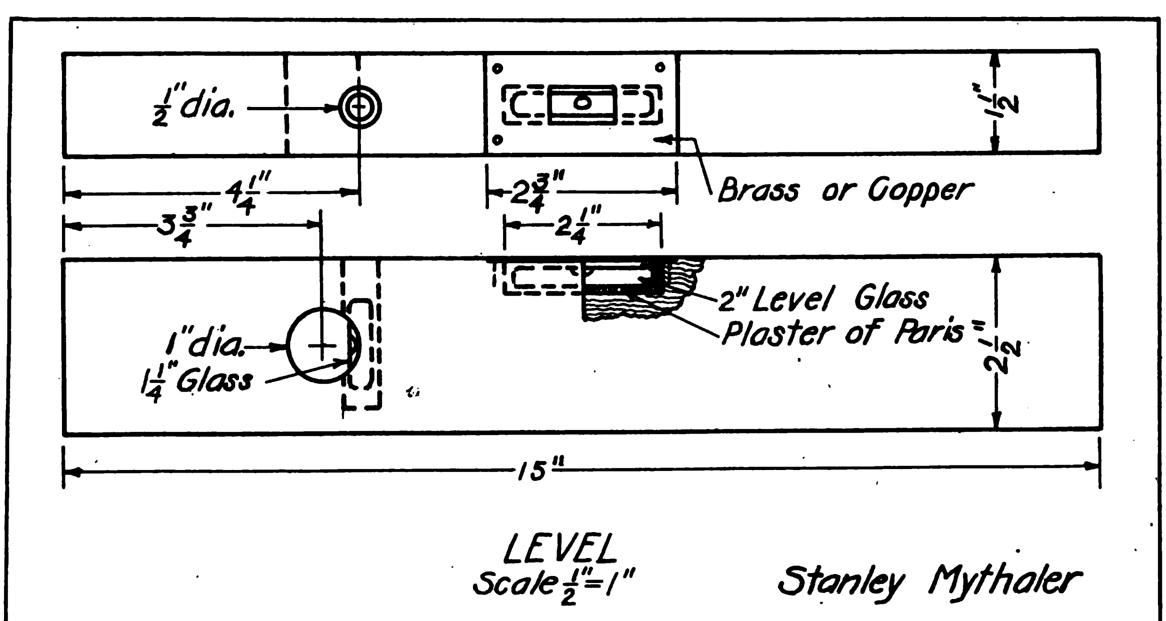
A LEVEL.

Stanley Mythaler, Director of Manual Training, Valley City, N. D.

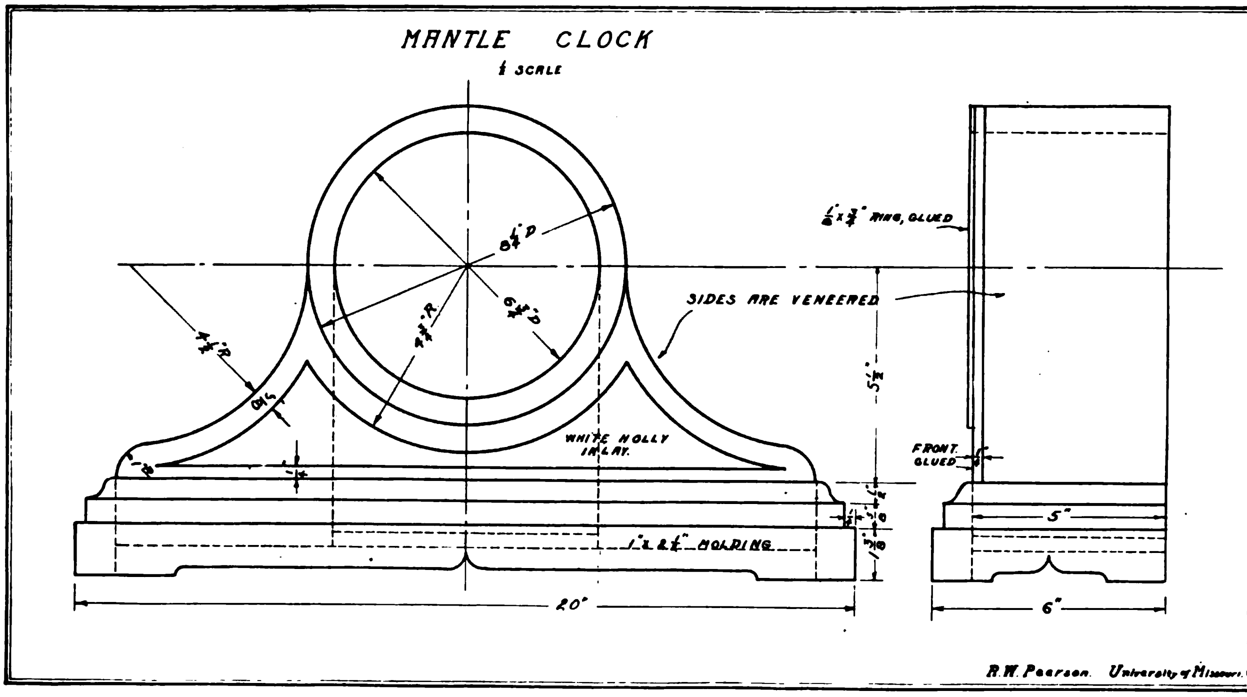
This project was worked out in mahogany and twenty gauge brass or copper was used for the plates. It is desirable that the plates be polished and then shellaced so that they will not rust.

The level glasses were obtained from a large hardware dealer. A carefully adjusted carpenter's level should be used to find a perfectly level and plumb plate in the shop, on which to set a level, while adjusting the glass in the wet plaster.

It is well to set one glass and let it dry for a day as a means of checking the work. The subsequent glass may then be set.



DETAIL OF CARPENTER'S OR MASON'S LEVEL.

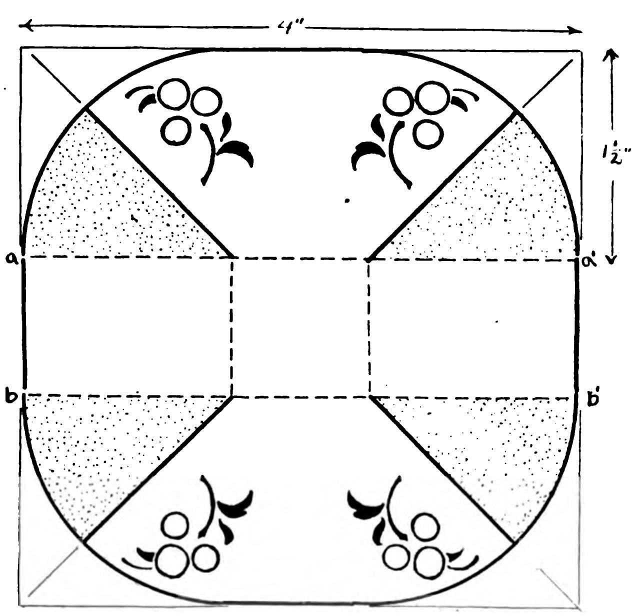


DETAILS OF MANTLE CLOCK.

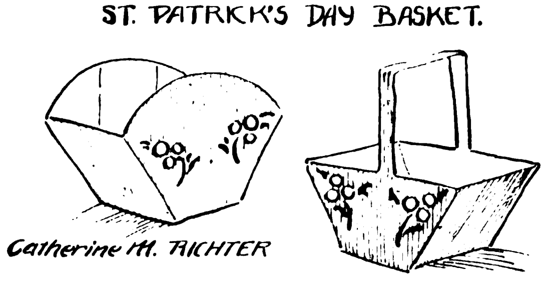
ST. PATRICK'S DAY BASKET.

Mrs. Catherine M. Richter, Long Beach, Calif.

Draw a four-inch square. Measure from the two upper corners down the sides one and one-half inches; and from the bottom corners up one and one-half inches, and connect these points, forming lines a-a′, b-b′. From the edge of the square, measure in on these lines one and one-half inches; connect these four points to form the square base of the basket. With these four corners as centers, draw four quarter-circles, one and one-half inch radius,



ST. PATRICK'S DAY BASKET.



one in each corner, thus completing the outline of the basket. Bisect each corner.

Tint the basket green, except the stippled portion, which is to be left white. Draw the design, punching or cutting out the tiny circles, and painting the leaves and stems black. Cut on solid lines, fold the dotted ones. Push the stippled portions in place behind the design, and paste. It can be made with or without handles.

A variation shown can be made by cutting straight across from the intersection of circle and bisecting the line to a point opposite, and to the lettered points, thus eliminating the curved effect.

This project makes a pretty nut cup for the table and has the advantage of being simple and easy to make.

A MANTEL CLOCK.

R. W. Pearson, Instructor in Woodwork, University of Missouri.

This mantel clock has been worked out with splendid success in the shops under the direction of the writer. It involves several principles in woodwork that are rather interesting and in general is satisfactory as involving a large number of processes and forms of construction.

The original clock was made in mahogany and inlaid with holly. Very little difficulty will be had in getting clock works from any jewelry supply house.

A PICTURE FRAME.

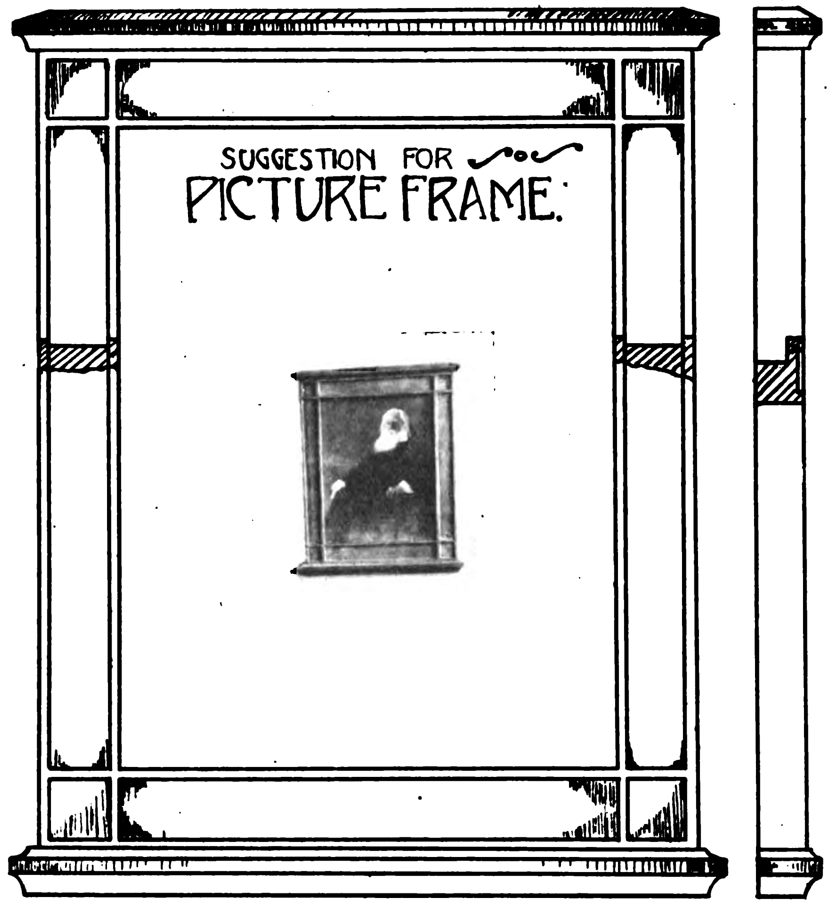
Max Wallenstein, New York City.

This picture frame is designed for the kind of a photograph or painting of a portrait here shown. The frame is a simple adaption of a similar, but more elaborate frame in the Metropolitan Museum of Art in New York City.

The base of the frame is a simple mitre joint with the usual rebate for a picture frame. The strips on the outside and inside edges of this frame are simple pieces of wood which vary from one-eighth of an inch to one-half of an inch in width, their size depending upon the size of the frame. If strips are not desired, the same effect may be obtained by painting a line along the end in place of strips. The size of these strips depends upon the size of the frame.

This frame has been worked out successfully, for the portrait subject, in all sizes, 3x5", 6x8", 8x10", 10x12" up to three feet by five feet. The top and bottom cornices of the frame are simple pieces of wood, added to the top

and base of the frame after the strips or lineshave have been put on. For finishing this frame, either antique gold, or any shade of color can be used. This in accordance with the tone of the subject framed. There is no limit to the finishes in gilt, polychrome, and dull colors, that can be used in decoration and tone of the frame, to make it a harmonious part of the photo or portrait it adorns.



DETAIL OF PICTURE FRAME.

MAPPING HOME PROJECTS.

J. Q. Adams, Instructor in McMinnville, Agricultural Department.

In order to have the location of each student's home project visualized and conveniently at hand, and to most efficiently and systematically arrange trips for their supervision, the following plan is suggested:

A map or blueprint sufficiently large and in detail enough to show the location of each home project, road, and other important landmark is used. A convenient size is about 18 to 20 inches square with a scale of 1 inch to the mile. The map is mounted on thick cardboard or beaverboard to make it stiff and allow pins to be stuck into it.

A numbered, typewritten list of the students having projects is prepared and posted near the margin or some convenient place on the map.

Pins are stuck in the map at each point where there is a project, pinning down small square pieces of stiff white paper, each with a number corresponding to the number found on the numbered list which was pasted to the map. By this means each pin placed on the map has a number and by referring to the numbered list each can be identified as a certain student's project.

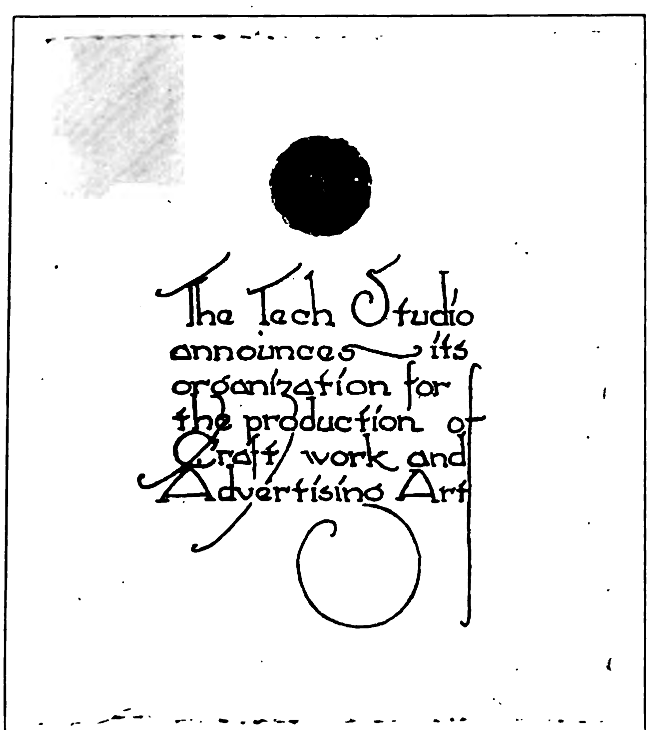
To further increase the value of this map, the pins used can be those with large, colored heads and a color can be assigned to each kind of project. For example, a black headed pin would represent a hog project; a white pin a sheep project; red, beef cattle; yellow, dairy cattle; green, grain project, etc. The color scheme adopted could be made a part of and added to the numbered list referred to above.

In addition, the distances in miles from the high school to each project, as determined by the speedometer on the instructor's car, as well as the usual or average time necessary in making the trip can be recorded and either be placed as an addition to the list on the map, or kept in a pocket memorandum. Remarks concerning the roads, their usual condition, and any other items necessary to know in first making the trip can be included.

A list showing the telephone numbers of each student having a project is convenient to have in arranging trips.

A project visitation record in which each visit to each project is recorded by dates is necessary and a useful aid in preparing reports and preventing a possibility of overlooking some projects.

The plan as suggested records valuable information for use of the instructor and others who may wish to visit projects and locate them unassisted if necessary, or in the case of a change in instructors, temporarily or permanently, gives the new instructor a chance to take up the work of project supervision without inconveniences and more efficiently than would otherwise result.—*Salem, Ore., News-Item.*



Hand Lettered Announcement of the Art Department, Technical High School, Buffalo, N. Y.

THE CHICAGO EXHIBIT OF BIRDHOUSES OF 1920.

The Chicago schools in 1920 exhibited the birdhouses produced in the grade school shops in the great store of Marshall Field & Company.

The firm was so interested in the display that it gave valuable sales space, provided artistic decorations, and prepared special posters—all without cost to the schools. The exhibit, which was prepared under the direction of the elementary manual arts and art departments, daily drew large crowds of citizens.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Refinishing Hardwood Floors and Interior Woodwork.

107. Q:—Some time ago, I bought this house. It is finished downstairs in oak and has oak floors. The woodwork had all been stained and filled, and some of it given a coat of flat-finish varnish. The floors had been scraped, but nothing else had been done to them. The house had been built for several years and occupied during most of the time, so you may judge of the state of the floors at the present time. I am going to ask your advice about finishing these floors.

I am going to re-scrape and sand them, so you may begin with the filler. The other woodwork is stained, what is generally called brown oak. This is for your guidance as to the color for the floor. I should think that this floor with its long seasoning could stand a very hard, inflexible filler. Please give the name of the firms making the materials you advise using. I want to varnish the floors. What do you advise as the best varnish for them? I am partial to Valspar, while I notice that you have recommended Pratt & Lambert's No. 61. I used it over a shellac filler on a table top that I thought would get considerable wear. It has not worn at all well and has checked very badly.

Would you advise filling the rest of the woodwork? Some of it has not been filled at all and some very poorly, and varnish it or leaving it dull? The stair treads have been stained darker than the balustrade. I would like to varnish them to save them from wear. Would you advise trying to get them to the same shade as the adjoining woodwork or leaving them as they are? What is the best white enamel that you know of?—M. B. M.

A:—I would earnestly advise you to hire an electric sander or in case this power is not available, a gasoline sander, in order to properly prepare your floors. Hand scraping on old floors by any man other than one long experienced in the trade, is the most discouraging and back-breaking operation that he can face. The power machine with its coarse sandpaper can rapidly tear the rough surface down to the clean bright wood and when the No. ½ grade sandpaper is placed on the rolls, the sanding machine will produce a splendid surface on floors utterly hopeless from a hand-scraping viewpoint.

Should it be out of the question to obtain either machine, it is best to strip off the old finish with boiling hot water and two pounds of Gold Dust powder to a twelve quart pail of water. This should be applied with a fiber scrubbing brush and allowed to stand five or ten minutes. As soon as the varnish has softened up, it should be mopped up with clean hot water and a large sponge. Avoid slopping on too much water and work a strip five or six boards wide, the full length of the room, rather than in small blocks.

While the floor is still damp, it may be quite readily scraped to a finish, quicker work being accomplished with a beveled-edge scraper, rather than an edge turned on a square finish. In case it is not necessary to remove old varnish, the work of scraping will be rendered much easier by sponging on slightly a mixture of gasoline and linseed oil in proportion of one cup of linseed oil to a gallon of gasoline. This enables the scraper to cut in quickly and avoids the greater amount of drag which the dry surface would otherwise cause.

Assuming that the floor has been scraped and properly sanded, carefully remove all excess dust and work with either rubbers or soft tennis shoes in order to avoid heel marks and scratches. Prepare a filler from silex flour, which has been added to a mixture of twelve parts boiled linseed oil, six parts dark japan drier and one part turpentine, to make a very stiff dough. This produces a filler of absolute permanency and forms a stock material from which sufficient amount may be taken from time to time to act as a base material for colored filler ready for use.

The dough-like material should be diluted with benzine to the consistency of milk and may then be shaded with Van Dyke brown, raw and burnt sienna, raw and burnt umber, French ochre, drop black and rose lake to produce practically any shade of brown that may be desired. Some knowledge, of course, of these tinting colors will be necessary in order to produce the desired shades which can be arrived at only thru a little careful experimentation.

Starting with five or six boards wide on the far side of the room, opposite the door, the filler should be carefully rubbed in across the grain with an old, wide, but rather stuffy paint brush, which has been carefully cleaned. Pieces of burlap cut about a foot square may be used to clean up this strip of brushed on filler, working constantly across the grain, after first using a burlap pad in a rotary motion to force the filler into the pores and cracks. As soon as this is done a fresh piece of burlap may be used to clean up all excess and leave the work free of any smear or cloudiness.

In case the joints in the boards are open and unsightly, they should be filled with the putty-like base material, tinted to the proper shade and carefully tooled into the joints. After this has been done for the entire floors, the regular operation of filling may be performed. The rooms should be closed to exclude dust, and a temperature of about 75 degrees should be maintained for forty-eight hours. After this the floors should be gone over with No. ½ paper without a block in order to clean up any dingy spots left from improperly wiped filler.

For varnishing work on floors, I like to use a quart tin pail with a fine wire stretched tightly from one bale to another. This will enable the brush to be wiped quickly on the wire, thereby avoiding the unsightly sags and partially dried varnish which soon spoil a pail of good material. I have found that a four-inch, heavy, black-china bristle of the flat brush type, or a similar brush of the oval type, forms the most economical means of distributing the varnish.

Never use shellac under varnish on floors. The trouble which you mention as having occurred with P. & L. No. 61 on your table, was undoubtedly due to the fact that you had a considerable amount of shellac as a base material. Shellac affords entirely too smooth a surface in quantity to be used under varnish and in no case should be applied in excess of one coat other than as a sizing material made from stock reduced to the thinness of water with denatured alcohol. On floor work where shellac is used, the varnish inevitably flakes off and regardless of its quality shows white abrasion marks.

The room should be quite warm before attempting varnish work. About 80 degrees is correct, since the floor is always five to ten degrees cooler than the surrounding atmosphere. The work of varnishing should be started as for filling on the side of the room opposite the door, carrying a strip across the room five or six boards wide, and working in such a manner as to enable the workman to see the gloss on the newly varnished surface, thereby insuring an evenly brushed coat, free from skips and holidays.

This first coat should be brushed out evenly and carefully, avoiding any tendency toward flowing on a heavy coat. Cleanliness in the varnish work may be secured by wiping the floor just ahead of the brush work with a piece of clean cheesecloth, which has been thoroly wrung out after all parts have been saturated with varnish. This tacky cloth will pick up and hold on to an unbelievable amount of dust which has escaped the hand least three days, a week is better, after which the gloss of the first coat should be cuffed off with No. ½ paper, brush in dusting. The floor should be allowed to dry at and the hand, avoiding a block. A tacky cloth may then be used to wipe up the floor just ahead of the varnishing as in the case of the first coat. If a dull finish is desired, P. & L. No. 61 dull may be used in preference to the gloss. Let the second coat dry one week before using.

In regard to the stair treads, I would advise that these be scraped and cleaned as for the floors and the color matched; otherwise, so prominent a structure will form a very obtrusive feature in the house.

The woodwork forms a strenuous problem in itself. In case the standing trim is flat faced or plain, it may be cleaned up with "gold dust" and scraped as for the floors.

In case no scraping is undertaken, all work previously washed with "gold dust" should be thoroly sponged with hot vinegar, otherwise the small amount of soap powder left in the pores of the wood may cause future trouble. Perhaps filling with a colored material will produce a satisfactory job, over which one or more coats of varnish may be applied. This varnish work can be rubbed down with 00 steel wool or F pumice stone and a rubbing brush to produce a very satisfactory job.

In case this treatment does not give promise of good results, I am suggesting that all woodwork be washed with a "gold dust" solution in the proportion of one cup of powder to a twelve-quart pail of warm water, in order to remove the collection of dust and grime accumulated thru years of use. Use a good, stiff scrubbing brush and plenty of elbow grease. Clean off with a sponge and plenty of water and afterwards wash down with vinegar. Let the work dry a couple of days; fill all necessary portions with an uncolored filler; let dry forty-eight hours; sand clean; wipe off with a tacky cloth and lay on a carefully applied coat of P. & L. undercoater, tinted to whatever shade is desired. At least two coats of undercoater should be applied and sanded carefully between coats. Over the last coat brush on Vitrolite Egg Shell Enamel tinted to the desired shade.

Without having actually seen the job in question, I am offering these suggestions as a possible means of what will probably prove a most trying job.—Ralph G. Waring.

White Metal.

149. Q:—Is it possible that you could give me one or two successful formulae for the mixing of metals for white or soft metal castings, or could you give me any references?—H. T. F.

A:—Metal Workers' Handy Book, by Wm. T. Brannt, H. C. Baird & Co., Inc., New York; Henley's Book of Recipes, Formulaes and Processes, N. W. Henley Publishing Co., New York.

Dust Cloth Compound.

163—Q.: What is a good compound for using on a dustless mop? One can buy a preparation but it seems very expensive to me and I thought I could make my own if I had a good formula.—M. B. M.

A.: For all practical purposes the following formula is satisfactory for use on dustless mops and cloths for cleaning floors:

One quart of paraffine oil.
One pint of turpentine or benzine.
One teaspoonful of oil of cedar.

Ralph G. Waring.

Removing Spots from Ivory.

165—Q.: I have had several women ask me if I could remove the brown spots from French ivory toilet articles. These spots were caused by toilet waters and face lotions and come on very gradually. In time they turn to ugly brown spots. Can you tell me any chemical that will remove these spots and not injure the ivory.—R. W. J.

The spots can be removed by the application of a cleaning cream made by the manufacturers of the toilet ware provided this is done immediately after the toilet water has been spilled on the toilet article.

If the spots are not given prompt attention, and sink further into the material, there is no "home made" way to remove them. The only possible way of doing this requires rebuffing and refinishing and this must be done at the factory where the toilet ware is made. If it happens to be ivory pyralin, the owner can have this rebuffing and refinishing done by sending it to her dealer who will return it to the manufacturer. This work is charged to the customer at actual cost.

NEW BOOKS

Pine-Needle Basketry.

By Linna L. Millikin. Cloth, royal octavo, 38 pages. J. L. Hammett Co., Cambridge, Mass.

This book will be welcomed by teachers and craft workers who have undertaken to make mats and baskets with that fascinating new material—the long-leaf pine needle.

The book begins with illustrated explanations of the very simplest processes—the preparation of the materials, the typical stitches, the working up of the forms and finishing.

The final section contains detailed directions for making a number of special forms of trays, mats and baskets.

The book is exceptionally well illustrated and printed.

Pattern Making.

By Joseph A. Shelly. Cloth, octavo, 341 pages. The Industrial Press, Publishers, New York, N. Y.

This book is a complete presentation of the methods of making and using patterns for metal casting. The author introduces his subject by defining the various types of patterns and describing their use. He then takes up the problems of tools and machinery and proceeds to pattern joinery from the simplest forms to the most complicated. Core box construction, pattern turning, cylinder wheel, propeller and gear patterns are then in sequence. The difficult combination pattern and complicated work of the largest sizes complete the work. Special chapters on finishing of patterns, on lumber and on the care of saws, are added. A large quantity of typical patterns is included in the illustrations and much information is given to assist the reader in meeting common problems and difficulties. Care seems to have been taken, however, not to include any variety of unrelated problems, but rather to make every illustration and every paragraph of the description cover an essential fact, or principle, necessary to the logical development of the subject.

The book makes a strong appeal for reference and supplementary reading purposes, both for the experienced pattern maker and teacher of the subject. Students will find it a decided help for clarifying shop explanations and making right principles stand out in clear relief from routine processes.

Carpentry for Beginners.

By Wm. Fairham. Cloth, 12mo., 217 pages. J. B. Lippincott Co., Philadelphia, Pa.

This book will be found an excellent addition to the school library. It is a rather complete guide to the elementary principles and processes of wood working. In addition to explanations of tools and tool processes, it suggests a series of small carpentry and simple cabinet making problems.

How Paper Boxes Are Made.

By Robert F. Salade. Cloth, 12mo., 225 pages. The Shears Publishing Co., Lafayette, Ind.

The box-making business is an offshoot of the book bindery and has, in recent years, grown to such proportions that it exceeds in the value of its products, the parent industry. Folding boxes, set-up boxes, corrugated shipping containers, fiber shipping boxes, fancy boxes—what business does not sell and what individual does not buy goods packed in one or more of these productions of the box maker?

The present book is a general descriptive work—the pioneer in the field. It describes in detail the materials, machinery, tools and processes of making the most generally used paper boxes. It is untechnical in treatment but sufficiently inclusive to appeal to the expert as well as the learner and the general reader.

The book will make an excellent addition to any vocational guidance library and will be especially helpful for teachers in communities where the industry exists. In some future edition the author might well add a chapter on the occupational possibilities of the industry, including analyses of the trades included, processes, and wage opportunities.

Practical Trade Mathematics.

By James A. Moyer and Charles H. Sampson. Cloth, 169 pages, illustrated. John Wiley & Sons, Inc., New York.

This arithmetic addresses itself to electricians, machinists, carpenters and plumbers. The lessons deal with the practical mathematics of the workshop. Tools, devices and machinery come into play. Measurements, dimensions and contents are brought to the studies.

The ten chapters of the book include fractions, percentages, ratio and proportion, and the practical application of geometry. The illustrations, which deal with wood, iron and other products, serve to enhance the interest in the lessons that are woven about them.

The authors have succeeded in bringing to their service the very things that will hold the attention of the mechanic and give him the practical mathematics so helpful in productive labors.

THE INDUSTRIAL-ARTS MAGAZINE

APRIL - 1921
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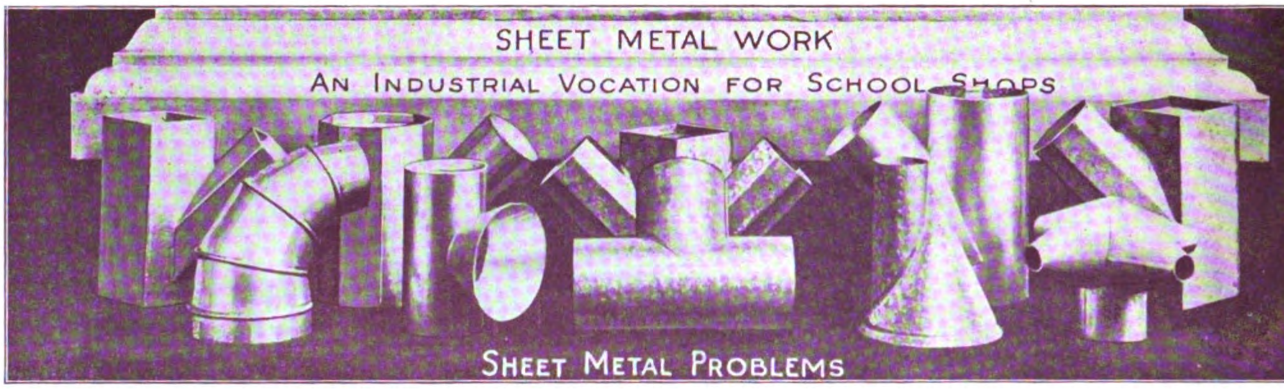

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INDUSTRIAL-ARTS MAGAZINE

Volume X APRIL, 1921 Number 4

Suggested Courses for Foremen Training Classes

James McKinney, Assistant Professor of Industrial Education, University of Illinois

POINT OF VIEW IN ESTABLISHING A COURSE OF STUDY.

MANY attempts have been made to establish classes of various kinds for the benefit of workers in industrial plants. Some of them have been successful, and others have, on the other hand, been complete failures. It is rather a curious commentary on human nature and also shows how strong a hold our past experiences have on us; as we find that when the corporation school made its first attempt to establish training for its workers it very frankly said that the public school was not meeting its needs. They accused the public school of giving children a lot of education which seemed to fit no one for anything in particular. They rather harshly told the schoolmaster that his product could not read, write or figure with any degree of accuracy, and yet when we examine the courses of study which have been developed in factory schools, we find a great similarity to the thing which they so severely criticised. Their courses of study are often patterned very much after the courses in our public schools. In fact, the interest in going to the factory school has been no greater than that of attending public school, and in some cases young men and women have actually "thrown up" good jobs rather than be obliged to attend the factory school. In establishing work of this kind one has to hold fast to some of the fundamental principles of education, as learning by doing; of progressing from the concrete to the abstract; of stimulating the learner to think and make accurate judgment; and then forget very largely how we ourselves were taught.

The Problem of the Foreman Course.

The problem of training foremen has all the difficulties of the corporation school for the worker plus some new and peculiar problems of its own. To suggest that the foremen are ignorant and require training would immediately spell disaster for the whole scheme. The problems must be tackled in an absolutely open manner with "all the cards on the table face up." Foremen themselves must realize a real necessity for taking training or else there is no use in starting classes. If the work which is suggested will not make the man feel he is to become a better and more valued worker, the starting of a class had better be delayed.

There are two distinct phases in the matter of training foremen; one, which we might call trade extension work, has to do with getting a better and more scientific understanding of the production job; the other, which we might call for want of a better term, instruction training, and has to do with the whole matter of giving instruction about new processes to learners and the general problem of giving instructions about work.

I. Trade Extension Work.

Production problems; planning, routing, scheduling, executing, dispatching, standards, etc.

Related technical subjects as mathematics, drawing, science, English, etc.

Just what the foreman has to know about the production problems will have to be determined by the factory executives, and perhaps the best man to teach this material is someone on the executive force who has a very good grasp of this problem and who has taken some teacher training. The method for carrying out this work will very largely have to take the form of discussions on practical problems of the plant, that is, the men themselves who are taking the course will bring in problems and discuss them with this executive. This plan, as it were, "kills two birds with one stone" because the executive will be able to get the sympathetic backing of the foremen for the factory organization thru this method, and at the same time be able to get instructive criticism of the plan, as these men are after all the ones who actually carry the plans into operation and are therefore likely to see where they do not actually work efficiently. Each one of the items mentioned above could be taken in this manner with a series of problems suggested for discussion with the men.

When it comes to the matter of the related shop studies, here is where the analysis of subject matter will have to be gone into with great care, as it is on this point that most of the corporation schools have fallen down. Their work has been too formal. It has failed to raise any or much enthusiasm, "to know how and why" about the shop work. It has dealt too largely with giving mere information and not presenting enough real shop problems for study and solution. The subjects of mathematics, science, drawing, English, etc., have been treated too much as subjects and not enough as *tools*

for solving and understanding the problems of the shop. The one test that ought to be in front of the people who are establishing the content of the course is one of, Where does this information actually function? On what job is it actually used? Will it make the worker take a larger and more intelligent interest in the job? This course of study cannot be laid out by any one man and ought to be settled upon in joint conference with the foremen, some of the executives, and the director in charge of the training work.

It is easy to draw up a course of study like the following, and say that this stuff will be *good* for the apprentice, mechanic or foremen.

Mathematics.

Common fractions. Decimal fractions. Ratio. Proportion. Percentage. Simple equations. Use of formulae. Measurement of angles. Square root. Solution of right angle triangles. Making and reading of graphs. Mechanics as applied to Force, Motion, Levers, Pulleys, Wheel and Axle, etc. General laws of Work, Energy, Power.

Such a course might serve the purpose of a technical high school, where the attendance is a matter of compulsion, but it will not serve the purpose of a corporation training course where men are independent and really know what they want. The needs of the plant will be met more successfully if forms are drawn and an analysis made of: first, jobs; second, mathematics required to do this job; third, any special mathematical devices such as tools, instruments, formulae, handbooks, etc., which are used in the factory. The mathematics then become a necessary tool for completing a job satisfactorily, or a basis of understanding with some intelligence on how it was done.

Science.

The same general point of view would be prominent in science, that is, an analysis of the science factors that a foreman requires to know to carry on his job effectively would be made, and each of the following items could be studied with this idea in mind:

(Terms applicable to matter, certain kind, conditions.

Matter	**(Forms**	**(Liquid.**	
		(Gas.	
		(Solid.	
Mechanics	**(Law of Motion.**		
	(Friction.		
Lubricant	**(Oils**	**(Vegetable.**	
		(Animal.	
	(Grease.		
	(Viscosity.		
	(Flash and fire test.		
	(Solid.		
	(Graphite Talc.		
Heat	**(Measurement.**		
	(Change in dimension.		
	(Co-efficient of expansion.		
Metallurgy	**(General properties of metals.**		
	(Process of manipulation.		
	(Lead, tin, solder,		
	(Bearing metals, brasses,		
	(Babbet, aluminum.		
Strength of Materials.	**(Strength of metals.**		**Stresses**
	(Elasticity.		**Tensile**
			Torsional
			Shearing
			Transverse
			Compression
Centrifugal Force	**(Fly wheels.**		
	(Abrasion wheels.	**(Bonds**	
		(Grain	
		(Grade	
		(Kinds	
Electricity	**(Magnetism.**		
	(Theories of magnetism.		
	(Dynamos.		
	(Motors.		
	(A. C. & D. C. current.		
	(Amperage volting circuit.		
	(Dry Cells, wet cells.		
	(Induction coil.		
	(Electric furnace.		
	(Electric welding.		

This example will be concerned with men who are engaged in machine shop practice, but other similar studies could be worked out for men in different trades.

With regard to English, the same point of view of analysis to determine where the matter functions holds again.

(1) What demands for written work are made of the foreman on his job?

(2) Outside of his job?

The following ideas are given for a closer study on English; topic being the idea which is in the teacher's mind; problem being that which the class or group will face.

English.

Problem.		**Topic.**
Shop magazine reading.	**1.**	**Trade literature (reading) note clearness, proper use of tenses, punctuation, meaning of words, and spelling.**
The use of trade books and handbooks.	**2.**	**Trade literature.**
Describing a simple shop operation.	**3.**	**Oral composition. Description.**
Explaining the why of some shop job.	**4.**	**Oral composition. Explanation.**
Reporting a shop accident.	**5.**	**Oral composition. Narration.**
The pros and cons about some new shop plan.	**6.**	**Argumentation.**
Describe in writing some of the measuring tools.	**7.**	**Simple description of tools.**
Describe in writing a simple bench operation.	**8.**	**Composition. Clearness, proper use of tenses, punctuation, spelling.**
Describe a laying out process.	**9.**	**Composition. Unity, coherence.**
Letter writing. Several topics as ordering tools, etc.	**10.**	**Composition. Paragraphing and clearness.**
Make an outline of a process embodying a number of steps.	**11.**	**Composition. Outline.**
Make a complaint about the filling of an order.	**12.**	**Business correspondence. Brevity. Clearness. Tone, courtesy.**
Make an application for a position as a foreman.	**13.**	**Business correspondence. Applicant's qualifications.**

The main idea underlying all the work is to bring out the idea of clearness, right meaning of words, proper tenses.

By reading good English, the men will see these things in their right relationship.

Some simple rules of speech may be given in mimeograph form and will constitute the authority or "rules of the game."

Drawing.

Again, we shall start with the analysis of what does the foreman in your plant have to know about drawing.

(1) Ability to make freehand sketches.

(2) Ability to make mechanical drawings or do drafting.

(3) Ability to read blueprints.

(4) What information does the man actually get and use from the blueprints that come into his hands?

Breaking up a Course of Study Into Short Units.

After the analysis is made, and the specifications for the content of the course settled, the real problem in breaking up this content into suitable units of instruction becomes evident. There is no reason for each man taking the whole of any one course which is suggested. Some men, for instance, might know all they are required to know about drawing; again, some men might know, for practical purposes, a good part of the English course and would like very much to take only a part of the English course. This being the case, units of instruction should be arranged so that is is possible for a man to take single courses or parts of any one course.

II. The Instruction Job.

The writer feels that this part of the job is a distinct new trade process for the foreman to learn, and therefore has to be tackled from the point of view of actually learning a new trade. Some men have, of course, been doing good work on this side of their job, but it has been done very largely on the basis of trial and error method, and very often they have succeeded in doing a piece of good work simply because nature had endowed them with a likeable disposition. The following outline of a course of study is suggested for this part of the foreman's job which has to do with instruction:

1. Analysis of what the foreman has to teach learners.

(a) Production job	**(Tool operations. (Assembling. (Miscellaneous.**
(b) Technical job	**(Trade drawing. (Trade mathematics.**
(c) Auxiliary Information	**(Working properties of materials. (Safety first. (Information about tools and machines. (Trade terms, plant regulations, etc.**

2. Getting a routing plan of instruction for the learner.
The question of learning difficulties and production difficulties.

3. Method of Instruction.

1. The instructing job a different job from the production job.
Production turns out finished goods.
Instruction turns out good worker.

2. The operation steps in an instruction job.
The worker's line of thought.
The foreman's line of thought.
The difference between telling and showing and real instruction.
The trial and test of the learner.

3. Supervised instruction on the job.

4. The art of being a Leader or "Boss."

1. The relation between foreman and worker.
2. Organization for handling different types of instruction.
3. Group and individual instruction.
4. Instruction conditions.
5. The factors of attention and interest.
6. The place of theory and practice.
7. Keeping instruction records.

Method of Carrying out Suggested Plan.

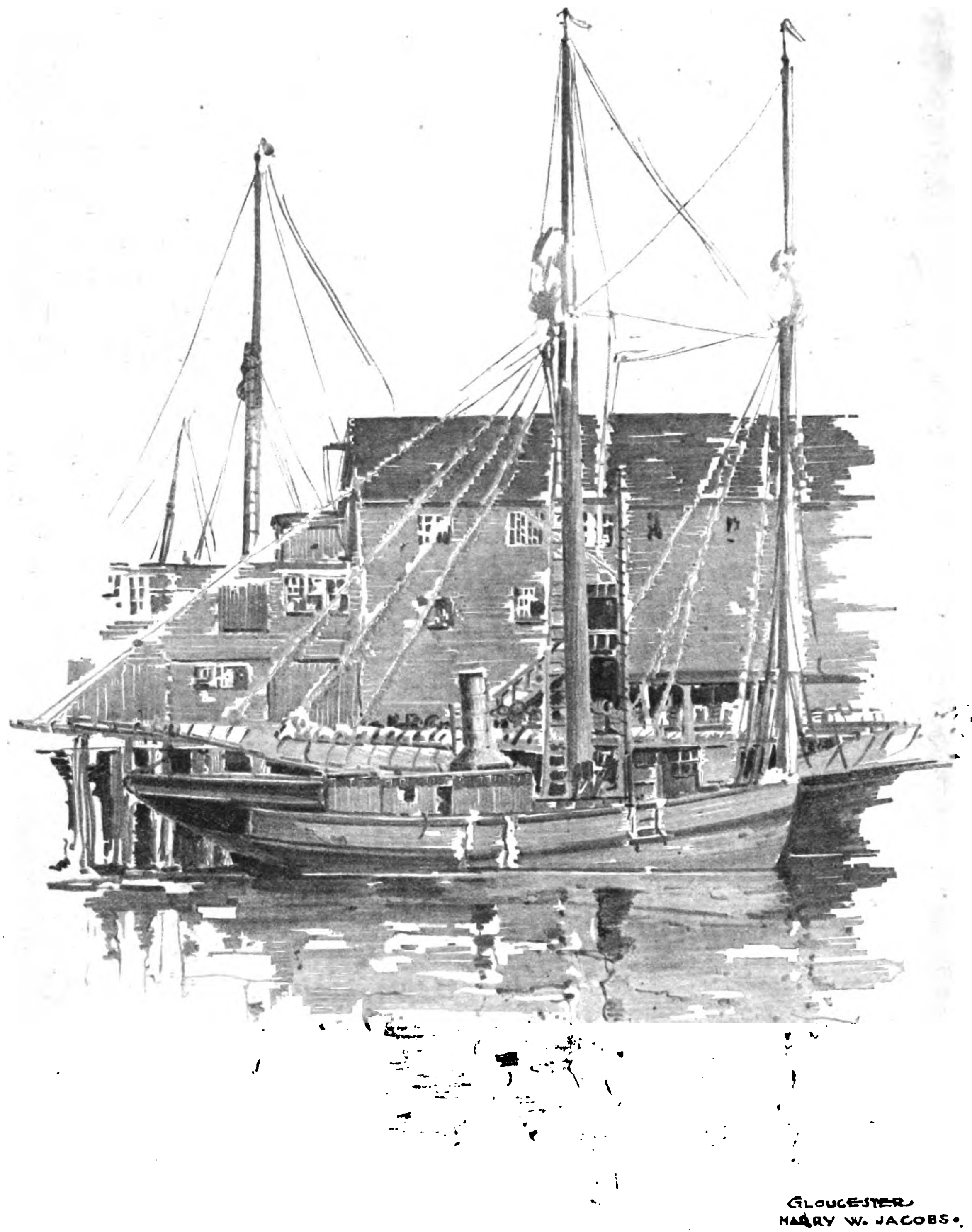
Of course, the whole success of any such instruction plan will hinge entirely upon the kind of men who are to be the teachers in these classes. Here the writer will suggest some plans which he believes will work out if they are given a fair trial. Before any such work is attempted, the management ought to have in their training department a man who has had factory experience and who is also strong on the instructional side of the work and familiar with the vocational education problem. This man should, with the help of the management, pick out from the plant one or two men who are strong on production and technical problems and give these men special training on how to teach effectively. Failing in this, vocational teachers from outside of the plant could be selected and given special training on putting over the teaching plan. After this course has been completed and the teachers prepared for their work, the related shop study classes for the foremen could be organized and started. At the same time, the specialist in vocational education should also organize classes on the instruction problem and carry these out himself. After the work is completed, classes to make the workers more efficient can be started, carrying out the same general plan and method. The foreman works in close cooperation with the teacher of the related subjects and is responsible for the shopwork.

The Success of a Training Plan.

To train the foreman as an instructor is a first essential to any successful scheme for training the workers. Your trained foreman will be an invaluable help to the learner, as he will now fully realize his part in the training plan. He will see the shop job as a part of the educational process. The change in point of view will make him a real guide and counsellor to the workers who are anxious to struggle ahead and "make good."

As a final word the writer is going to emphasize the need of caution in going ahead with this kind of work. Everybody seems to think that it is quite easy to do and offers a great field. Foremen training is a great field, but nothing should be attempted until a careful preliminary study of the situation has been made.

Such a scheme of training will not solve all the "ills" that pertain to industry, but it is a scheme of education which will keep the mind of the worker turned *towards his work* instead of *away from it*, and provide an active brain with some food for thought on the problem of finding out "how" and "why" about the job instead of brooding over real and apparent social wrongs, will do much to act as a stabilizer in our maelstrom of political and social unrest.


GLOUCESTER
HARRY W. JACOBS

PENCIL SKETCHING—Part II

Harry W. Jacobs, Director Art Education, Buffalo, N. Y.

IN the opening article on Pencil Sketching in the February issue, we discussed the materials used and illustrated a variety of strokes by many sketches that are well adapted to this particular medium.

When the teacher and student have acquainted themselves with the materials, and practiced the various strokes, we are ready to attempt some simple subject as a sketch.

In selecting our first sketch, it is best to choose one that is simple in character, that is, the drawing must not be too difficult, the planes of the masses must be large, with little detail, and be easily selected, and the subject in general present a pleasing composition. With these stipulations in mind, it is best to present to the class or individual, a number of prints of one subject, that they may all work out this first problem as a class, thus gaining by observation and criticism the work of the class in general.

A group of small houses at Lanesville, Gloucester, Mass. (halftone illustration), which was photographed last summer with this particular use of the subject in mind, will serve as a subject for our first sketch.

Emphasis should be laid on the use of the camera as an excellent way of gathering reference material for drawing classes, not only for out-of-door sketching subjects, but for material of a general nature which can be cataloged and be always at hand whenever the demands of your classes call for reference material. The writer always carries a camera wherever he goes, because many times a sketch is snapped where there was no time at hand to draw, or a hurried sketch is made and the "lever pressed" to refer to in making a finished drawing. Such experience with a camera is bound to improve one's picture-making sense. You find your picture thru the view finder and move about until you have adjusted within this finder the best combination of lines and masses that will go to make a pleasing composition.

We have determined our subject and have selected the most interesting point of view, our center of interest is unmistakable in the dark mass the doorway presents, the masses are simple with the strong sunlight coming from the right and behind. The foreground is simple, broken here and there by masses of grass and groups of rocks, so characteristic of New England, and the perspective rendering of the subject is well within the ability of the high school student.

It has been found more successful to start by selecting the important parts of our picture and make simple, direct drawings of these interesting parts, than by attempting the larger subject. This procedure in a way reviews the various strokes considered in our first article and places into practice these strokes, allowing the student to judge the quality of tone and the manner and direction of the strokes to be rendered. These simple renderings lead to a quicker mastering of the technique of pencil drawing than by dealing with the complete sketch as an initial problem, and in no way does this approach to the subject detract from the interest and success of the final drawing, but tends to better results.

We will select as the most interesting feature of our subject, the doorway with its broken steps; the large rock in front of the doorway, with the weeds and grasses giving a contrast against the strong sunlit boarding; and the deep shadows of the doorway and steps, with the interesting shadows cast by doorway and shingles.

We block in the general proportion of the doorway and add the darkest dark to the shadowed entrance and under the boarding and steps, with a 2B pencil. The light side of the doorway is rendered in 4H value and the side that has the less direct light is drawn with a pencil of HB grade. While this contrast is more than actually exists in the picture, we must obtain a contrast of values for different planes. This is shown more strongly in the rendering of the foliage as it comes against the side of the house, the value being more intense in contrast with the value of the boarding. Each stroke follows the general plane of the part rendered as in the boarding, rocks and foliage (Sketch B).

Another important part of the picture is the window (Sketch A) partly opened and propped up by a stick. The darks in comparison with the light and surroundings of the window are made more intense to gain contrast. The darks are rendered with a 2B and HB pencil and the light values with a 4H pencil, the accenting, as under the shingles and boarding, is done with a sharpened point of a HB pencil.

The old pipe, cemented into a frame which is attached to the roof, serves as the chimney for the old house. This and the old weather-beaten shingles are worth rendering (Sketch D). The darks of the chimney and the shadow cast by the overhanging roof were first drawn, the shingles and boarding were drawn in 4H value with accents made with a HB pencil. The white paper is continually allowed to show thru, which adds a sparkle to the contrasting values.

The tree that casts a deep shadow over the small addition to the building offers the opportunity of foliage rendering. I have suggested the lower portion of the tree in simple massed strokes of HB and 4H value. The manner of rendering such strokes is controlled by the direction of the masses of light and dark leaf arrangements, each mass of light and dark must make a pleasing pattern in relation of one to the other (Sketch C).

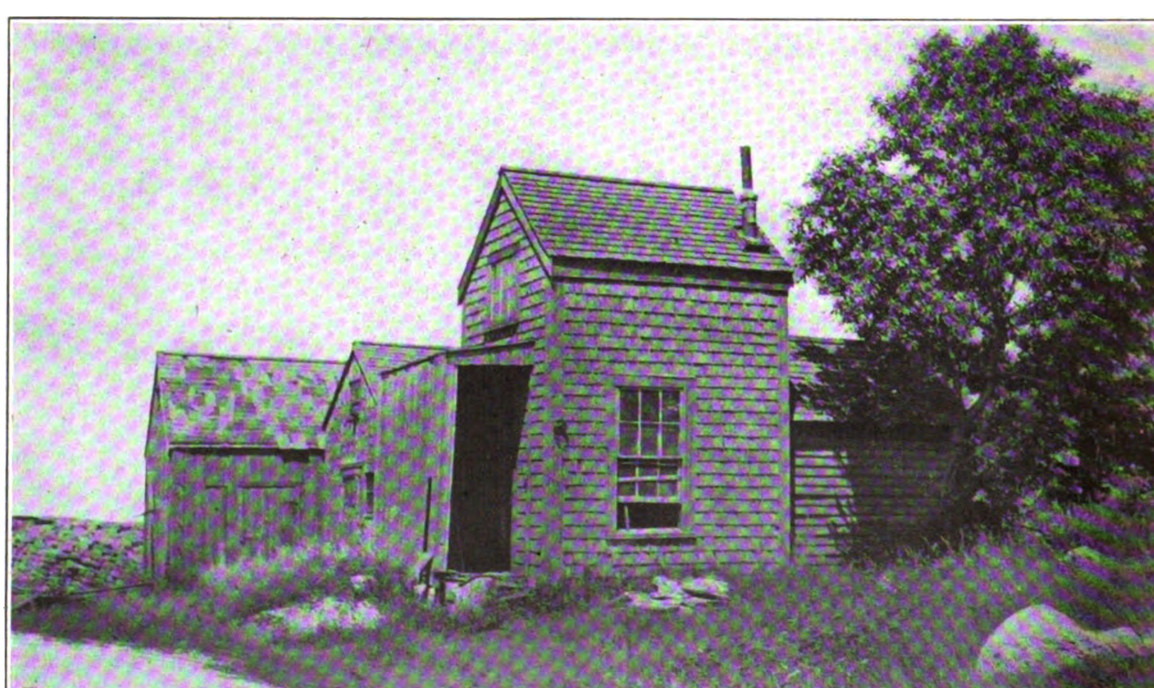
THE COMPLETED SKETCH.

Under the window is an interesting pile of rocks or field stone with grass and foliage. As the value of the rocks is light, the grass must be drawn in contrast to this lighter value; a 4H and HB pencil was used for this sketch (Sketch E).

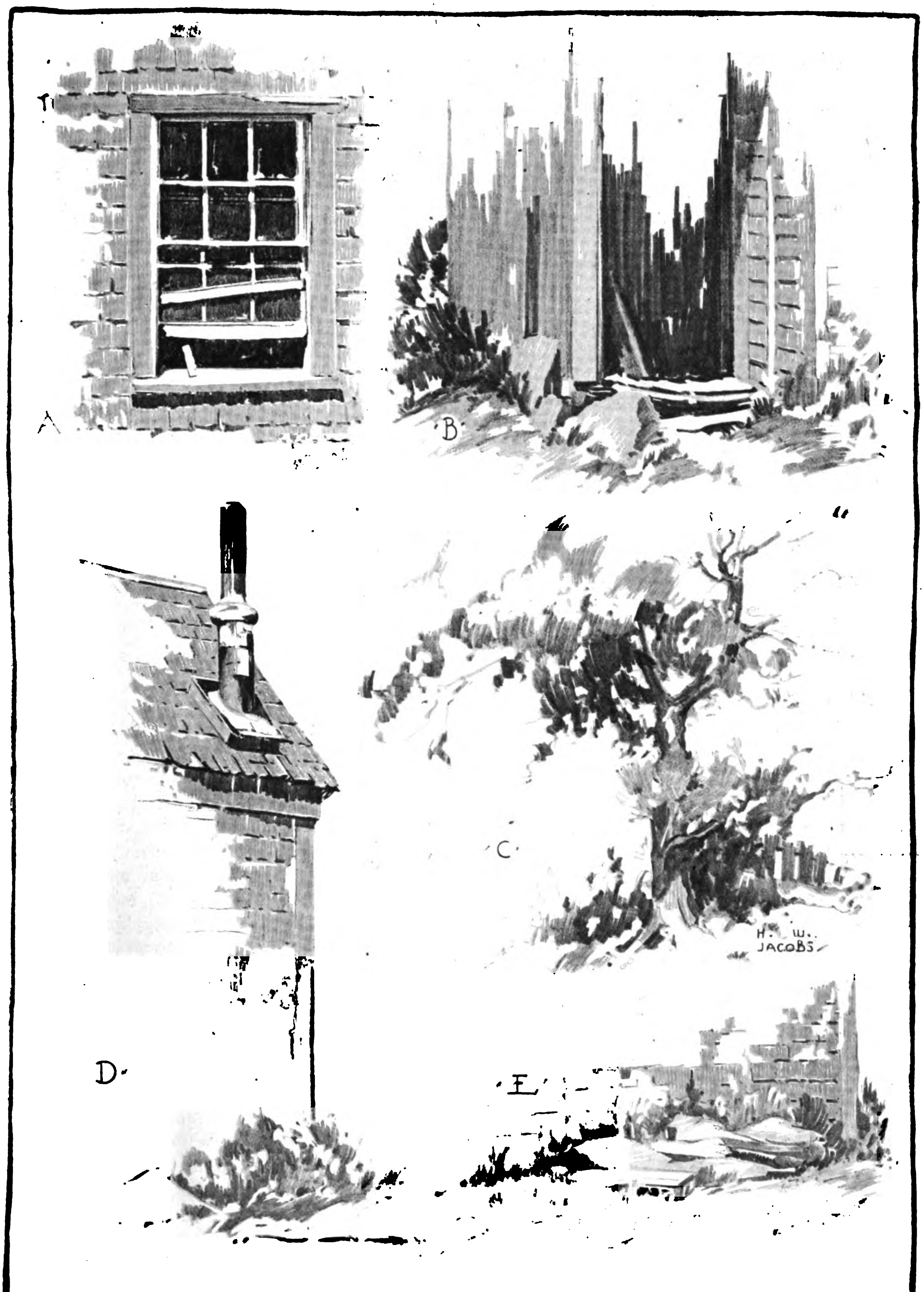
After rendering these five interesting parts and obtaining a class criticism of the drawings, we are ready to start the complete sketch.

A most successful plan, wherever possible, is to have the teacher render at this time, on a large sheet of paper 22"x28" with large pencils of varying degrees (which can be purchased at any representative art dealers') the sketch selected, as it will present to the class a systematic method of approaching the complete subject.

After drawing the general leading lines of the sketch, by carefully noting the proportions and the problem in perspective that confronts us, we are ready



THE ORIGINAL PHOTOGRAPH.


A
B
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H. W.
JACOBS
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E

to lay in our darkest values. In the beginning it is well to make your perspective drawing rather complete, separating such values of light and dark by outlining the mass forms, as example, the shadow cast by the door, and tree on the end of the building. All these preliminary lines should be drawn very lightly, as none should appear in the final sketch.

With the carefully, but lightly perspective outline completed, we place in the dark masses of the doorway, window and chimney with a few touches of the dark value in the tree, all of which gives you a value scale from light to dark (light the tone of the paper) from which you can judge all intervening tones.

In making a complete sketch, it is best to work from the center of interest out, that is after you have distributed your darks and set your value scale, return to the doorway, the center of interest, and work from there out, keeping in mind the front of the house is in light and the side of a slightly darker value. Work this way in a mass of direct strokes, drawing the value of the various sides of the buildings, and roofs, foreground and foliage. After the general massing in of values has been completed, return to the center of interest and with an HB pencil sharpened to a medium point accent your sketch, being sure to keep the accents of less importance as you draw away from your interest point. This is also true of the masses, the darker masses occur near the center of interest and gradually break into lighter mass and line as they go away. All lines and masses should exalt the center of interest, that is, they should lead the eye to the center of the picture.

In the completed picture, the eye is carried to the doorway, altho there are equal darks distributed thruout the drawing. Even the dark shadow cast by the tree does not hold the eye. The tree and the buildings on the left are not drawn in complete form but are suggested in mass form, both enhancing the center of interest and making the sketch more complete.

In every sketch attempted, one is obliged to omit considerable detail and objects that actually appear, and on the other hand to add where there is needed a tree, shrubs, fence or foreground, in order to complete and round out the drawing.

In the full-page drawing of Gloucester wharves, the values are kept as simple as possible, keeping the interest centered about the open doorway of the large warehouse. This drawing was made in about one hour's time with a large audience of boys asking a million questions. One must get used to audiences in sketching out of doors, for the many remarks made are not as complimentary as those made by the child admirer. As one old salt said as he gazed over my shoulder, "You must be hard up for something to draw, to draw that old place." I learnt afterward that this vessel and the company that controlled it had just come in with a big fish haul and was a big competitor of the vessel that this salt sailed on—so I felt better.

The Administrator and the Part-Time School

H. V. Church, Principal J. Sterling Morton High School, Cicero, Ill.

THIS is the day of the rise of the part-time school in the United States. Such schools are not absolutely new today, for both abroad and in this country there have been part-time schools which date back more than fifteen years, but it is only within the last ten years that there has been much agitation for them, and only within the last five that there has been a marked interest in their establishment. Ten years ago Wisconsin set up her split control part-time schools; today almost one-half of the commonwealths of the United States have enacted laws which require part-time schools. Thruout the decade just past more than one country besides the United States has decided that it was fully time that it set its educational house in order and do something for that majority of adolescents between 14 and 16 years of age who are not in school. Germany has had such schools, notably in Munich; France now has adequate plans, England has met the demand in her Fisher bill, the United States has its Smith-Hughes law and as a consequence of it there are concurrent laws in 25 states today. Therefore it behooves every schoolman to acquaint himself with the movement, to devise plans for the administration of such a school, and do his utmost to find funds to float it. The part-time school is upon us, and we must meet it in a sincere and whole-souled manner.

At the outset one should not confuse part-time schools with evening schools. There is much loose writing and thinking on this point today. It is regrettable that readers' guides and magazine indexes scramble these two widely differing kinds of schools. An evening school is a continuation school in but a small sense of the word. The continuation feature is seldom present, for the short unit courses given in the evening schools are for many different classes of adults who are not pursuing an educational course, recently broken off, but are for those who suddenly find themselves totally unprepared or only partially prepared, for some calling recently entered into, and who, desiring to fit themselves for their new occupation, avail themselves of the evening instruction and pursue these short unit courses in the evening while they follow their regular stated employment in the daytime. A part-time school, on the other hand, is one for those who are employed, who have not completed an elementary or secondary course, and who spend part of the time, regularly devoted to day employment, in a school in which they continue an educational course but recently broken off.

European and American Movements.

Before the world war began there were part-time schools in Germany and in the United States. At that time progressive educators in these two countries were interesting themselves in part-time schools, but the agitation was following different channels in the two countries. In Germany the leaders were bent on developing citizens with the end of extending the power of that country, or rather in making the youth of their country worshippers and willing disciples of the emperor. In the United States the educators were striving to educate for citizenship with no other end than that the citizen should rise to a higher level. Then came the world war, and it had a tremendous effect upon this type of school. The movement for continuation schools advanced rapidly, for the well-known efficiency of the rank of the German Army caused French, English and American educators to review their educational shortcomings and immediately to decide where amendment should begin. The result in England is well known, for thru the Fisher bill part-time schools have full recognition there and are on a better basis in some respects than in the States. France at once set her educational machine in motion, and part-time schools will soon be found thruout France. Quickened by this same stimulus, the Smith-Hughes law was passed, and as a result of this federal law and of the feeling that we must keep abreast of the world's advance, our part-time schools found their foundation in the laws of many states in this country. Hence we can say that the world war had one of its most pronounced results in this department of public education.

Altho quickened by the world war, legislation for part-time schools has a deeper meaning than efficiency and military training for the youth of any nation. Those who were prominent in bringing about the enactment of part-time school laws saw farther than simply competing with Germany or outstripping her in the preparation of their youth. A wider meaning lies underneath all this legislation. Those for whom it was enacted are today recognized as the neglected asset of a nation. The youth of a country are not all in the schools. Over one-half of those between 14 and 16 years of age are not in school. They are not only not in school but they are, for the most part, not in employment that leads anywhere. The majority of these adolescents are the drifters, those who are "hired and fired." Still further, it is recognized by educators that these neglected youths have now at last come into rights hitherto long denied them.

New Obligations for Schoolmen.

It can well be said that part-time school laws are bills of rights for these children. But this legislation means not only more rights for the children, but it means additional obligations to schoolmen. No right-thinking schoolman can sit back and say, "Part-time school laws are wonderful laws, just what we have been looking for this long time. Now that the laws require the children to remain longer in school, the problem of the education of the youth of the country is solved." An extension of school age for a year or two will not accomplish the end sought. A new heaven and a new earth are not in sight because part-time school laws are enacted. Along with the added opportunity given by the extension of schooling must come a better apprecia-tion of the problem of education. Changes in methods must come with the part-time school. Not only information that will aid in later life, but principles and ideas must be given that will supply needs, will equip to meet new situations, and will help to solve problem after problem as they come in later life.

It is to be hoped that the old struggle between unit and dual control of school systems will not have to be fought over again. Ten years ago that struggle was on, and the National Society for the Promotion of Industrial Education was the arena in which the big fight took place. In some states, notably in Wisconsin with her cleft control, it looked as if the modified dual system was victor, but in most of the states unit control won the day and the schools of each community are destined to move under the leadership of one administrator. But with the passing of the Smith-Hughes bill in 1917, the National Society, referred to above, won its fight in Congress, and now gradually, as the states enact legislation to conform with the Smith-Hughes law, the old question comes back in a slightly different form. For altho there is one administrator at the head of each system now, if he adjusts his school so as to receive Smith-Hughes reimbursements, he will soon find that he must almost run two schools in order to get the maximum returns from Smith-Hughes money.

Dual Control vs. Democracy.

In the part-time schools of some of the great cities today the dual system is found with almost separate control, with separate buildings, separate corps of instructors and separate curriculum. This is exactly what should not take place, difficult as it is to avoid in a large city system. The part-time pupils should not be separated from full-time pupils; they are not separated in the grammar schools before they are 14 years of age and they should not be separated after they are 14 years of age. If our educational system is a broad educational stairway from the kindergarten thru the university, there should be no back stairs for part-time pupils. There should be no mechanical device of separate buildings, separate faculty, separate curriculum to set these adolescents apart in a separate caste. Let them all, both full-time and part-time pupils, grow up in the same school in the same community, to be good citizens of the same state.

Schoolmen should not forget in establishing a part-time school that this is a democracy in which we live and that schools should be run on broad, democratic lines. As soon as the schoolman immerses himself in the details and problems of a part-time school—and the

details are many and the problems complex—he must keep ever before him the principle that schools must be democratic, that the whole plan must be cosmopolitan, for at once he finds himself face to face with the fact that the part-time school is going to be an expensive proposition, and altho there is reimbursement from the State thru Federal government, he will find himself molding his school along undemocratic lines if he follows closely the regulations laid down by the state boards which handle the Federal money. In the first place the schoolman will be pressed for room for part-time classes. He should not be led astray by offers of corporations to set apart rooms for their employees somewhere in their plant if he will run a branch part-time school there. Neither should he feel that he must set up his part-time school in a separate building, for thus he has set apart his part-time pupils as those of a different caste, and has done a reprehensible thing in the eyes of all democratic, broad-minded schoolmen.

The details of the manipulation of the Smith-Hughes money are something as follows: If you use part of the time of a regular teacher to teach continuation classes, only that part of his time which is devoted to the continuation classes can be reimbursed; all the time of such a teacher devoted to study hall, home rooms, and conferences cannot be reimbursed. Whereas if one assigns the full time of the teacher to the continuation work all the time of that teacher comes in for reimbursement whether he devotes all of his time to classroom work or not. Now this interpretation on the part of vocational boards in commonwealths one can see at once works for an undemocratic situation, for it forces schoolmen who are pressed for funds to use teachers their full time in the continuation work in order to get complete reimbursement for that teacher's salary. Thus he has set apart a teacher in separate classes, with a separate piece of work, with a separate group of pupils. It would be more democratic to mingle pupils of the full-time and part-time schools and also have the teachers teach both full-time and part-time classes wherever possible.

Surveys Not Particularly Valuable.

The first bit of work that occurs to a schoolman in connection with the setting up of a part-time school is that it would be wise to make a survey of his district. But a survey is quite likely to be a waste of money, for now-a-days industrial populations are almost liquid and flow about without reason. Unless the community is an old and settled one, a survey would be worth little for part-time school purposes, for by the time it was completed many would have moved in and many would have moved out. It would be far wiser to call on the employers of those persons whose ages lie between 14 and 16 years of age and find out what these employers would like to have taught in a part-time school. My experience after such conferences was that the employers felt that they could do a much better piece of work instructing the part-time pupils in the vocational side of the work and that they hoped that the part-time school would emphasize chiefly English and mathematics. If I had set up a part-time school on the basis of a survey of my district and without knowing what the employers desired, the continuation work in my part-time school would have been of a very much different nature. I am firmly convinced that it is a part of wisdom to work with the employers from first to last, for a part-time school administrator will find that he will have most powerful assistance and cordial cooperation from the employers of the part-time pupils.

The next step is to get the names and addresses of the pupils who ought to attend your part-time school. If the officers who have issued the work certificates to those who leave the schools and go into employment as soon as they are 14 years of age have done a good piece of work, from their records one can obtain the names and addresses of those who ought to be in this school. A brief letter to these pupils, with the proper excerpt from the law, will bring them at the proper time to the school. One should also secure the cooperation of these certificating officers, for he should be promptly notified each time a new work certificate is issued. As his part-time school gets under way, one will constantly have the feeling that he has not obtained the names of all who ought to be in his school, and it is quite true his list is not complete, but he will have plenty of material from the work certificate sources to start a school. Later, one of his teachers can devote part of his time as an attendance officer and will in a very short time find the stragglers that ought to be swept into the school.

English and Physical Training.

In laying out the course of study for part-time pupils the administrator should keep in mind that the one great object of the school is to make better citizens. Therefore, it seems to me that not only English and mathematics but also work in social science should be required. The third required item in the curriculum should be physical training. It is perfectly evident on assembling the full-time pupils and part-time pupils that the latter appear not only underfed, and undeveloped, but also, I regret to say, unwashed. The required work in physical training will mend all three of these shortcomings. We should constantly keep in mind the Fisher bill of England which requires not only physical training but vacation outings for the part-time pupils. England has written into her part-time law something that we should copy. Besides these four items which should be required, there should be elective subjects. For the girls, sewing, cooking, shorthand, typewriting, salesmanship, and millinery are good optional offerings. For the boys, all kinds of manual training and trade work should be given, for the part-time school should be a trade-preparatory school as well.

About the time one has decided on the curriculum for his part-time school, he feels that he must have teachers, and here is the crux of the whole proposition. *The director makes a fatal error when he decides that the part-time pupil can be trained by a mediocre teacher.*

Let him reflect that these pupils left school largely because the school was not giving them what they wanted. Perhaps half of those who are 14 and 15 years of age, and who are not in school, left because they were keen enough to see that they were not getting in school what they needed. For this type the best teacher that money can buy is necessary. There is another class of pupil that is more marked and more frequent in a part-time school, and that is the pupil who has an undiscovered aptitude. Now, I ask you, can such an one be trained to his limit by a mediocre teacher? Absolutely not. It will take the keenest, brightest, and most thoughtful teacher to draw out this second class of pupil.

A third class of pupil common in a part-time school is the one who believes that a schooling is of no value in his chosen calling and that it can assist him in no way to do better work. It takes a skillful teacher to show this type of pupil that he will grow more rapidly in his job and will advance faster, if he knows the history of this calling, if he knows the lives of those that made a success in it, if he knows the shortcomings of those that made a failure in it, if he knows the principles of the sciences that underlie it. No mediocre teacher can win such a boy to study to make himself a "workman approved." The teacher of a part-time school is the one that is so good that he should, in justice to the service rendered, be paid somewhat better than the average high-school teacher.

Program Making.

When it gets down to the little task of making out a program for the part-time pupils, employers must be consulted as to the time they prefer to release the pupils for the school work. Every effort should be made to conform to the wishes of the employers, for it is pretty inconvenient for an employer to be forced to release some of its employees to go to school at a time when he needs them most. The administrator of a part-time school should do his utmost to have the pupils come to the part-time school during the slack hours of the week.

In making up a part-time program a good plan is to set up four groups of pupils at one time; for example, let groups A, B, C and D report Monday mornings and Thursday mornings from 8 to 12 o'clock. There will be in these four groups from sixty to seventy pupils with a few over fifteen in each group. For physical training the boys in these four groups can be combined for one and the girls for another. This will put from thirty to 35 boys and from thirty to 35 girls in each physical training class. The groups can again separate for the optional subjects of typewriting, cooking, and sewing for girls, and mechanical drawing, shopwork and automobile mechanics for boys. Thus the program for these four groups would be: at 8 o'clock, group A, in English, B in social science, C in mathematics, D in natural science. At 8:40, 9:20 and 10 each group can go to one or other of the three remaining subjects. That would leave the remaining time to be split between physical training, in which the boys and girls are separated, and the optional subjects mentioned above.

It has been my experience that mingling the part-time pupils with the full-time pupils has made a great change in the personal appearance of the latter pupils. At first they are easily distinguished as the pupils move in the halls. In a short time they modify their dress, their care for their personal appearance and their deportment, so that they cannot be told from the others. It is a part of our plan to mingle these part-time pupils in the physical training classes and in the public speaking work with the full-time pupils. They join with the full-time pupils in the assembly every day and there enter into the mob life of the school in school songs, school cheers, and the general exercises of the daily assemblage of the school.

Grading Students.

When the pupils in response to the letters of notification come to the school, they must be graded. The basis of grading is important. We made the error of classifying the pupils according to the work they had completed in the school they had last attended. This is not a secure basis for classification. One cannot obtain homogeneous classes in this way. To put pupils who left the sixth grade three months ago with those who left the sixth grade a year or two years ago will not prove satisfactory. It will not be satisfactory to place twenty of those who have just left the seventh grade together in one class, even if they are to pursue an academic subject. The reason is that they have not all the same ability to learn. Take a group of twenty, some of whom left the eighth grade two months ago, some who left it fourteen months ago, and others who left it twenty-six months ago, and one has a very uneven group, practically an ungraded school. The best solution is to give these pupils an intelligence test and arrange them in classes in accordance with the results of the test. If one stops to reflect it is perfectly patent that an eighth grader who has been out of school for two years and who has a high ability to learn cannot travel with another eighth grader who has been out of school two years, but who has a low ability to learn. These two are more than two school years apart on their return to school and they will keep getting farther apart. In grading part-time pupils the results of intelligence tests furnish the best criterion for classification, the previous work in school the next.

Attendance and how to secure it, at first blush, looks like a hard problem to a part-time school administrator. It is one of the easiest connected with a part-time school. Most laws read "eight hours a week." If one will keep his eye on that slogan, the attendance problem almost disappears. Does the pupil play truant after attending part of a day's session? Hale him in and tell him he must miss an additional half-day of work this week to make up the time lost, for the law requires "eight hours a week." If he works for his employer in the morning, but is ill in the afternoon,

and therefore misses his part-time school, he may believe he has scored, but the next time he comes, require him to make up all time lost for his illness, for the law requires "eight hours a week." The extra time required of the part-time pupil promptly brings a reprimand from his employer, and the part-time pupil wants to hold his job and to stand well in the eyes of his employer. "Eight hours a week" brings about a better percentage of attendance in part-time school than can be attained in a full-time school.

Discipline and Other Problems.

Someone may rise to ask whether discipline is not more difficult in a part-time school than in a full-time school. Here again the cooperation of the employer is a specific in effecting a cure. If a pupil is called in and told that he is wasting his time and a second reprimand will bring his case to the attention of his employer, nothing more need be done. Some employers of the part-time pupils cooperate to the extent that they threaten the pupil with suspension from work in the factory until lost school time is made up. Our greatest difficulty with the part-time pupils is to get them to take a bath. They hate to bathe after a physical training period, and many have balked completely, on the days they have to go to the pool, on taking a shower bath always required before one is allowed to enter the pool. It may be this trouble will wear away in the spring, for perhaps they are sewed up for the winter. On one other item we have had some disobedience, and this is in regard to prepared school work. We require the preparation of lessons outside of school. We have had some trouble with pupils, whose interest in the work we have been unable to arouse, in having their work well prepared. A threat to report them to their employers has sometimes effected the change desired.

We are finding that it is wise to segregate the boys and girls in the continuation classes in one other subject besides sewing, cooking, shop, and physical training. In the science classes the girls have more concern in the science that relates to sewing, cooking, and other interests peculiarly feminine than in the weather, geology, physics, etc.; while the boys are enthusiastic about science that is industrial rather than domestic. But this conclusion is only part and parcel of a long known principle of pedagogy, that of interest.

The part-time school problems are new, complex, almost bewildering. The schoolman whose interests have been almost entirely cultural will have to shake himself, arise, and admit that a new vista is before him.

QUEEN ANNE FURNITURE

Leslie G. Martin, West Henrietta, N. Y.

THE Queen Anne period in English furniture includes the reigns of William and Mary, who occupied the throne from 1689 to 1702; of Queen Anne, who reigned from 1702 to 1714, and of King George I, who ascended the throne in 1714 and died in 1727. The furniture of the Queen Anne style continued to be popular after the crowning of George II and until the middle of his reign, when the influence of Thomas Chippendale began to be felt.

The houses of the Queen Anne period were interesting and artistic. The exteriors were distinctive and the interiors were noted for dignified rooms and halls. There were wide staircases and "barley-sugar" balusters and carved newel pendants. The doorways were often of the beautiful hooded type and many of the circular hoods were supported with brackets carved with lions' heads. The door jambs were ornamented with delicate interlaced carving. This period saw a revival of classical architecture in England and was noted for the construction of great public buildings, like the famous St. Paul's Cathedral, designed by Sir Christopher Wren.

The furniture of the Queen Anne period was more comfortable than that of the preceding period. The chair backs were shaped and the corners of the seat frames were rounded. Where this rounding occurred, a smooth cabriole leg or one carved with an escalloped shell with pendant husks below, was generally used. Later in the period cabriole legs were made to terminate in a vigorous ball-in-claw foot. The earlier Queen Anne chairs had a raised cresting on the center splat of the back. On later chairs, the splats were designed with a depression at the top. About 1710, chairs were designed with cabriole legs having scrolled knees, and the backs had fiddle-back splats. A carved shell decoration was used on the corners of the seat-frames and the stretchers were omitted. Some of the less expensive chairs, however, retained stretchers which were turned or shaped. The underside of the seat-frames also was shaped. The seats were generally upholstered but occasionally rush seating was used. The chair leg sometimes had a small astragal ring just above the claw and ball foot.

Marquetry was used to inlay the back splats of some of the chairs and the work, which showed Dutch influence, was quite elaborate. It was during the years from 1700-1705 that English marquetry reached its height of popularity. Altho marquetry and inlays of various woods were used, the color schemes were subdued. The marquetry was arranged in spandrel corners, ovals and circular panels and wide banding was employed. At first designs of natural flower and leaf forms were used, but these developed later into designs of scrolling acanthus leaves and conventional flowers. The later foliated work resembled the Italian. Marquetry furniture declined during the reign of George I.

Many of the earlier chairs in the Queen Anne style were veneered, but later many pieces of furniture were

made in plain walnut. This wood seems to have been the popular cabinet wood of the period.

During the period, writing chairs were made to go with small cabriole writing desks. These chairs were resemble some of the early Chippendale models. About 1710 wing chairs were made in more comfortable types. They were ornamented with carving showing the influence of current French and Italian furniture design.

2. SMALL TABLE, GEORGE I-ABOUT 1725. THE LEGS ARE OF THE CABRIOLE TYPE. THE TOP HAS A MOULDED EDGE. THE UNDER FRAMING IS SHAPED. SOME OF THESE SMALL TABLES WERE MADE SO THEY COULD BE EXTENDED.

1. CHEST OF DRAWERS. GEORGE I. 1710-1720. THE STAND HAS TURNED LEGS WITH INVERTED CUP SHAPE AT TOP. THE DRAWER FRONTS ARE VENEERED. THE STRETCHER IS SHAPED LIKE AN "X"

3. QUEEN ANNE ARM CHAIR, 1702 THE BACK SPLAT IS CARVED AND PIERCED. THE LEGS ARE OF THE CABRIOLE TYPE. THEY ARE CARVED WITH AN ACANTHUS LEAF DECORATION.

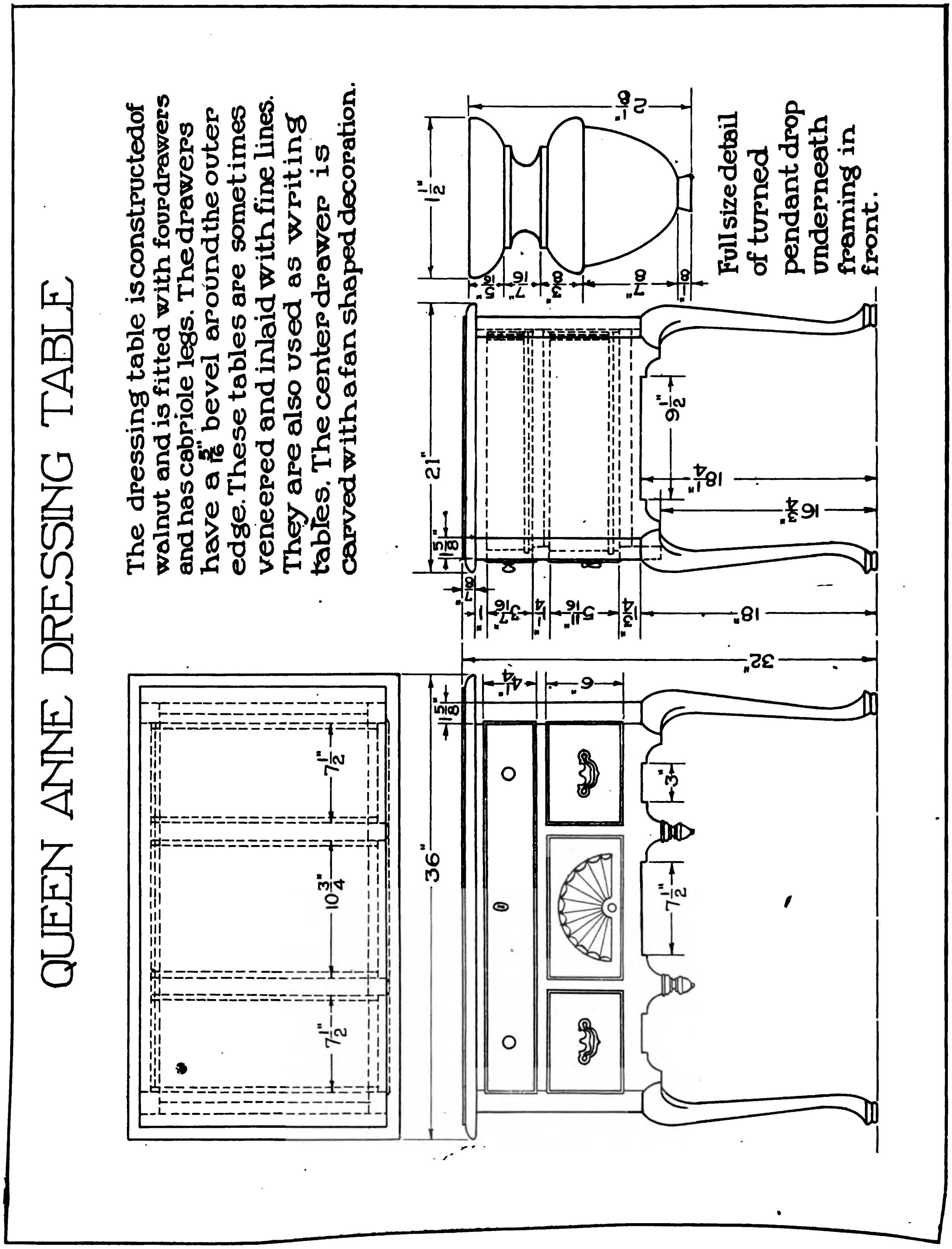
4. QUEEN ANNE, TALL BOY. CONSTRUCTED OF WALNUT AND FITTED WITH ELEVEN DRAWERS. THE DRAWER FRONTS ARE VENEERED AND INLAID.

5. GEORGE I, TALL-BOY. 1725. HAS CABRIOLE LEGS AND SHAPED UNDERFRAMING. THE DRAWER FRONTS ARE ORNAMENTED WITH A SIMPLE MOULDING AND CARVING.

QUEEN ANNE PERIOD.
WILLIAM & MARY 1689-1702
ANNE, 1702-1714.
GEORGE I, 1714-1727

QUEEN ANNE FURNITURE

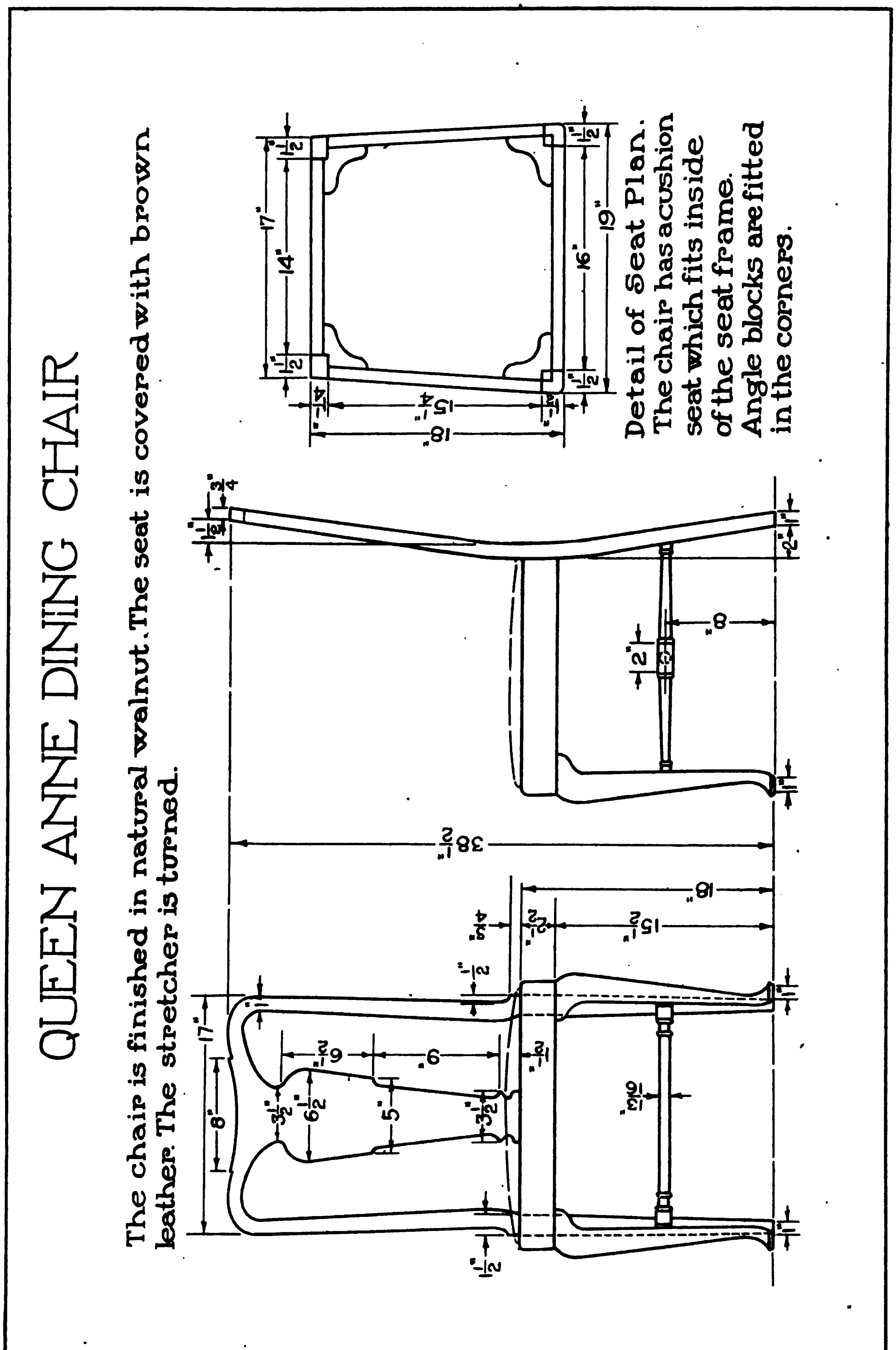
constructed with solid wood backs and curved arms and the upholstered seats were mounted in loose frames. Some of the chairs had pierced splats in the backs and They had seats of padded horse-hair, but no springs were used. The construction of the legs and stretchers was similar to that of the other models.



Settees changed considerable in design and construction after 1710. They were made much smaller and were called "love-seats." The arms were designed with outward curves and the backs were carved with rounded corners. The legs were of the cabriole type with club feet. On the seat covers petit-pointed needlework and tassled fringes were used. Settees of the double chair-back type had broad back splats ornamented with carved leaf forms. Later the settees were made with open arms instead of solid upholstered sides.

In the early part of Queen Anne's reign, stools were designed to match chairs and settees and were used principally for ornamental purposes.

Walnut secretaries were designed with classical cornices and half round friezes. The bracket foot was used on many cabinets and chests. Handles and draw



pulls were shaped and crudely engraved and the later types were pierced.

Bureau cabinets, usually of graceful proportions, were constructed with many drawers and pigeon holes. Design was frequently marked by the use of architectural details.

Single or double chests were the next development in new furniture. The chests were modified in various ways; some were made with several drawers on a stand with twisted or cabriole legs. On many types of chests veneering and banding were used.

During the Queen Anne period dressing tables with projecting fronts on the drawers came into use. The edges of the drawer fronts were molded and banded with various woods and drop handles were generally used. On the tables were placed small toilet glasses, which had

flat shaped heading and which later was developed into a bolder rectangular frame.

Lacquered furniture was also popular during the middle of the Queen Anne period. Lacquer was used on chests and chairs, cabinets and frames, and was either flat or molded in low relief. Delicate caning was used in some of the lacquered chair backs.

The years from 1714-1725, which was practically the span of time embraced in the reign of George I, are generally termed the "Decorated Queen Anne Period." A characteristic of furniture of this period was the use of eagles and other ornaments of a rather vigorous kind. Eagles' heads were carved on the arms of chairs and settees, on the knees of cabriole legs, and some of the more elaborate chairs, the ornament was picked out in gold. Another development was the carved leaf on the knee of the cabriole legs, carried around in a small pattern to form the ear piece. The chairs which gradually developed from the hoop-back to the square-back, were further carved with a gadroon molding on the seat framing. The cabriole legs were constructed with a long sweep, almost straight on the inside, and the back splats of the chairs were decorated with carved palmette patterns.

After 1720, mahogany became popular in furniture construction.

Tables of a variety of shapes were used. The gate-leg table was not common, but flap tables with Spanish scrolled feet were built. Card tables having turned legs terminating in club feet were constructed with circular and oval tops. Most of the tables were of rectangular shape and some were arranged so that they could be extended. A detail of some tables was a depression in the corners for holding candle sticks.

Between the years 1720-1740, legs of tables, stools, settees, and chairs were sometimes decorated with the heads and feet of lions. The detail which is thought to be of German origin, was largely carved in low relief. About 1730, the lion heads were carved with rings in the mouths and the feet were tufted.

During this time the construction of the furniture was very similar to the earlier Queen Anne models. Mahogany was used more than walnut and velvet replaced other materials for upholstering. Slightly later satyr-masks were carved on the furniture and claw-and-ball feet were used. The satyr heads had many variations; some were winged, others had horns, and still others followed an Italian type.

About 1735, during the reign of George II, a new ornament was introduced. This was the cabochon and leaf decoration of French origin. It was an artistic ornament and continued in popular favor until about 1750. During this time the lions' paw feet were carved on many pieces in a feeble manner. Castors of hard leather discs between brass plates were introduced.

Furniture designed between the years 1720-1750 shows many architectural influences due to the fact that many architects were actively engaged in designing chairs, tables and other movable pieces to harmonize with the general decorative schemes which they provided for homes. While many of the architectural features were beautiful, some of the elements were misapplied.

The Electrical Department in a Comprehensive High School

C. E. Crofoot, Utica Free Academy, Utica, N. Y.

The Day Classes

THERE are two distinct types of courses offered in the electrical department of our day school: First, a two-year vocational course; second, a four-year technical high school course (not college preparatory); third, a four-year technical high school course which is college preparatory.

The first, or vocational course, is organized under the Smith-Hughes plan, that is, for boys who are at least 14 years old or past the eighth grade. In our case all of the boys are grammar school graduates and ready for high school, but feel that they cannot stay in school long enough to complete a regular high school or technical course, and yet want to take up electricity as a life work. These boys attend three hours a day, or fifteen hours a week. The rest of the time is spent in applied mathematics, mechanical drawing, civics, and industrial history, etc. Their work covers a practical course in bell wiring, house wiring, wiring for light and power in factory and office buildings, principles and construction of D. C. generators and motors and the fundamental principles of A. C. circuits and A. C. machines. They are also given trouble shooting and general repair of electrical machines with two hours per week of theory and lecture work.

The second, or technical course, is designed especially for those who can and want to come for the four years but, in all probability, will not go on to college. These boys take one and one-half hours per day, or seven and one-half hours per week, for the four years. The balance of the time is spent in taking higher mathematics, science and other high school subjects which the vocational boys do not have time to take. The first and second years' work in the technical course is very much the same as that of the vocational group, but in their last two years they go more into the theory, testing, design, general maintenance and construction as applied to manufacturing and power plant installations. This is made possible by the fact that they have the advantage of the additional training in mathematics and science.

The third course is quite similar to the second, with the exception that those who are taking it are preparing for the engineering courses in college and are

therefore spending a little less time in electricity and taking up some other subjects which they must have for college entrance.

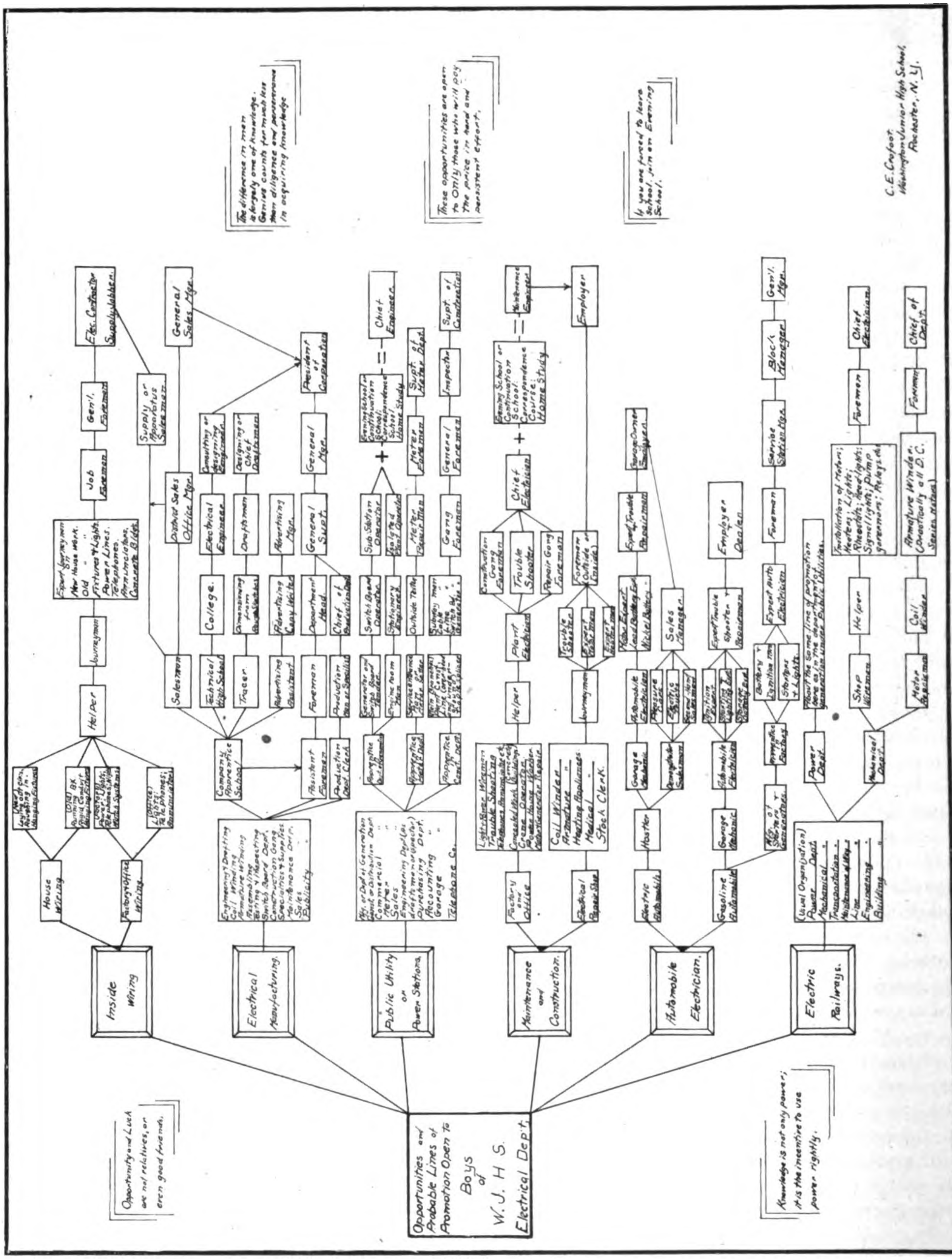
In brief, the general aim of all three courses is to give the boys a clear-cut idea of the fundamental principles of electricity and magnetism that are applied in the construction and uses of electrical machinery and appliances, as well as the best or principal methods of wiring buildings for the efficient distribution of light and power; to encourage or create a desire for home or individual study so that a boy will continue to develop in knowledge and efficiency after he is out of school. This may be still more briefly stated by saying that it is to get the boy in the habit of "doing his own thinking." This, without doubt, is a hard part of teaching, but it is the thing which will lift a boy, and finally the man, above the average much quicker than genius or special ability, which are really rare.

The writer, at first, used the stencil form of lesson sheet with complete drawings of each circuit or problem and no textbook. In place of the textbook, topics were assigned with each practical problem, for reading, in a number of different texts, handbooks and magazines, with a series of questions, after each problem, to test the result of study and practical work. After a thoro trial and careful observation it was found that this method failed in at least two essential points of our aim. It did not make him do his own thinking and also, in most cases, tended to make him study in a fickle and hit-or-miss sort of way. He is continually leafing over the pages, reading a few lines here and there, looking at pictures, etc., with the result that much of the time he does not half read the article called for or is reading something which is way in advance of what he should. As a result he is not willing to thoroly study the fundamentals which are so essential to a clear understanding of the big problems later. Do not infer from the above that the writer is not in favor of using handbooks, other textbooks, or pertinent articles in trade journals as references, for in fact it is just the opposite; in our department you will find a very complete list of them in constant use. But they are used in addition to a regular textbook to illustrate one of the most essential points in home study, namely, that of reading several authors to get a clearer understanding of a theory or principle and to show that a textbook should precede a handbook. The handbooks serve especially well in supplying the standard practice for applying the theory which is given in the text.

The best results were obtained by merely stating the problem in as near the way it will be stated to the student or workman after he is out on the job. To illustrate: When a wireman goes to install a bell he is not presented with a complete sketch of the whole installation. Much to the contrary, he is shown by the lady of the house just where she wants the button, bell and battery and informed that he must get it in with as little muss and disturbance as possible. He then has to study the house as to construction and make his own layout, or, in other words, "do his own thinking," right there on the job. Why not teach him that way in school? It is better to present him with a set of typical layouts after, rather than before, he has completed the problems, for he will then look upon them as data which he has helped to gather and will appreciate their true worth. Get a good text and show him how to study logically and to build his knowledge of electricity on a good foundation instead of the hit-or-miss fashion that many do, with the result that they later have to start over again. One cannot put too much emphasis on the fact that while a half knowledge of a subject may be good, it is usually the other half that you most need. Most boys want to get right at motors and generators, and if one is not careful they will spend much of their time in reading such articles which are way ahead of where they should. Most people will agree that it is not practical to shingle a house before we dig the cellar.

In carrying out such a course a great deal depends on the equipment which should be chosen with a view of its being as practical as possible and of the type generally used in actual construction work in the locality where the school is situated. For example, it seems to the writer that it is quite impractical to spend much time on knob and tube work in cities where that type of wiring is not allowed at all when, with careful planning, conduit work can be carried out, with but little extra expense and the student is becoming familiar with exactly the same things that he will get when out on the job. It is, of course, true that the knob and tube work will illustrate the typical circuits, but a boy will never get the manipulative skill and speed that he needs for handling pipe, picking out circuits and making connections in small boxes. If he goes out as a helper in such a place he is at a big disadvantage when put on conduit work. The same is true with bell wiring, for the boy who has always wired on a smooth board in school is somewhat lost when he is forced to fish wire up thru the wall of an old house or rough in a new one. But if he has been doing his work in school under this condition with studding, floor joists, doors and even windows set according to standard spacing, it will not be hard for him to apply it to the job. To sum up, the equipment should be carefully chosen, with practicability and maximum instructive value the determining factors rather than the needless duplication of equipment which is so often found in vocational and manual training departments. There is little use of having ten pieces of apparatus alike when not more than one or two will ever need to be in use at a time.

Next to the amount of equipment comes the way in which it is placed or laid out. Where possible it is best to use at least three rooms for the type of work described. One should be used entirely for the wiring or vocational class, with the center room serving as a tool room and shop, that is for lathe, drill press, grinder, winding machines and such other apparatus as is needed



for the construction and repair of motors, generators and other electrical appliances. The third room should be fitted up for an advanced testing laboratory for both groups. This arrangement makes possible the handling of two groups at once without interference and gives plenty of room for good work with each group. By using the one tool room we cut down on the amount of small tools needed. Where all the work is carried on in one room it is hard to keep the beginning class where they belong and at work, for they are always more interested in what the advanced class is doing than they are in their own work. Where possible, another small room, equipped with seats, blackboard, dark curtains and combination lantern, can be used to very good ad-

vantage, as both opaque and transparent slides can be used with splendid results, especially in evening school work.

A large part of the boys who will enter such a department will do so with no particular reason for their choice, except that "they thought they would like it." "A friend told them it was a good line." "It looks interesting," "It pays big money," or "They wanted to learn about motors." Only a very few will have any real reason for coming. In answer to this the writer has always found it a good plan to spend the first hour or two in drawing the class of beginners out on a careful analysis of the whole trade, showing them what the various lines are and where they will lead to; also what their probable line of promotion will be and what is required of the worker in the way of physical strength, education, environment, etc. After such an analysis many will decide that they are in the wrong place, and they are usually right, while, on the other hand, those who stick will be more keenly interested and will be working with a definite view of what they want. For use in connection with this vocational guidance the writer has worked up a chart, called an "Opportunity Chart," which shows the various lines or branches of the industry and the probable lines of promotion, it has proved of great value to both school and home in getting the boy started on a line for which he is fitted. It is surprising how many boys will spot the "blind alley" job themselves if given a sort of acid test which they can apply when choosing a vocation. It also helps them to see that it is not always the employer's fault when they are not promoted; perhaps the job isn't worth any more.

In summing up the things a boy must be taught if we would have him attain the higher stations in life, perhaps the foundation is to get him in the habit of "doing his own thinking" in a clear and logical way and to cultivate "self-reliance," "self-control" and "courtesy," for to be a success as an electrical worker he must think fast and with precision and have a fundamental knowledge of the subject which will enable him to trust his own judgment. To throw a switch at the wrong time, even under the strain of excitement or trouble may cost untold amounts of money and even human life. Electricity moves quickly, with no chance for a second thought. His work is such that it may take him into all sorts of industry, offices and homes, so he must maintain complete self-control and be courteous at all times if he would succeed. He should realize that brains and resourcefulness will always bring a much higher price in the industrial market than crude workmanship or raw material.

Evening Classes.

Our evening classes are made up of an entirely different type of students from that found in our day classes. The types of courses, however, differ but little from the general courses given in the day school, especially for the beginning group. But with the advanced group the work becomes more special in character, covering, in general, the same work, but most of the students doing only those parts which are of special interest to them. This is governed by the type of work they are doing in the daytime. Our whole evening class is at present made up of tradesmen.

There seems to be a general complaint about evening school classes falling down or being closed up for lack of students and regular attendance. This, in the opinion of the writer, largely because the students do not get what they want, instead of its being a characteristic trait of such people, as many claim. There are more finishers among them than they are generally given credit for. It is more often due to some of the following causes: "Lack of proper equipment," "wrong type of instruction," "overcrowding of classes at the start," and perhaps the most common of all, "attempting to dictate to the individual just what he needs." It is useless to advertise classes in the various branches of electricity or other industrial subjects unless there is a sufficient amount of equipment to carry them on efficiently, for the average evening-school student comes for the very purpose of getting a chance at equipment or apparatus which he does not have the opportunity of working with during the day, and if he does not get it, he will soon become disheartened and drop out. On the other hand, he may drop out because there is an abundance of equipment which is of no practical value in modern industry.

Perhaps the reason which is responsible for more losses than any other is the wrong type of instruction. There are too many schools that seem to think it is their business to tell students just what they should take; going on the assumption that most of them do not know what they want, or attempting to substitute something for the fellow who asks for a branch they do not like or want to teach. This assumption may be true, to a certain exent, with the one who is just taking up a new line of work, but upon careful examination it will be found that the regular tradesman does know what he wants or needs, and he will not waste much time in the evening class that cannot give it in a more or less direct way. It may be hard for him to explain just what he wants, but if the instructor will put himself in the place of the student, and imagine himself going thru the daily routine with the fellow somewhere out on the job, he will find he is better able to help analyze the job and the needs of the student for future advancement. A great deal of individual work must be done by both instructor and student. The instructor must be interested in the things that go to make up the daily life of the student. A whole lot can be accomplished in this way if the instructor will make it a point to show his interest by calling on his students as much as possible, while they are at work during the day to see for himself, just what their problems are. This is especially true with those who are working in power plants or similar places. In a great many cases the evening students will seek help in lines quite apart from

the primary work of the class and if the instructor knows, first hand, the conditions under which the student is working he can give many valuable suggestions that will help. The instructor who is in it merely for the extra money and has not enough time or interest to follow it up with a whole lot of outside preparation had better quit, for he is likely to be heading toward failure, as far as evening school work is concerned.

In several cases the writer has, at the request of the students, gone out into the plants where the men were working and helped them to solve some of the problems that have puzzled them. They were reluctant to go to their employer for fear he would misunderstand them and put them down as incompetent. This may be accomplished on a Saturday or at an evening visit, but first get permission of the employer for such visits. In this way the instructor can gather practical problems and the men can also be induced to bring in practical questions for class discussions which will be of great help to the whole class. When the student sees that the school is really interested in him he will be interested in the school and by thus giving it his whole-hearted support will profit greatly himself. Again, this sort of work will make a man take a new view of his own job. He will begin to go at it in a more analytical sort of way that will soon make him a more efficient and valuable man. The writer has heard of several instances where that very thing has nearly doubled the income of the student, for he cannot be enthusiastic about his work without putting more thought and energy into it and getting results which will bring him to the attention of his employer.

All theory, class discussions, etc., must be given from a practical viewpoint and put in shop terms to be effective. They must be of such a character and given in such a way that the student can take it right back to his job and put it into practice. That is his test; the only one he knows how to make, and if it doesn't work he is suspicious and is liable to say that "This school stuff is all bunk," and quit. In class discussions most evening students are timid or afraid of what the other fellow might think and therefore will not ask many of the questions they really want answered. In this connection the instructor who has had practical experience can, in many cases, anticipate the question that is in their minds and casually give it an answer. When this is successfully done it will be found that a new interest has been awakened and the instructor will have gained a great deal of added confidence from the class. Class trips to power plants, sub-stations, and large manufacturing plants will prove of great help and very instructive if a question sheet is prepared beforehand so that attention will be called to the particular thing which that plant can give.

To measure the success of an evening school solely by numbers is wrong and will result in failure, in most cases. The evening student works all day so the evening is his only time for self-improvement, and unless the class is kept down to a number that will give him a reasonable amount of the instructor's time, he soon begins to feel that his time is being wasted and gradually drops out. In this case it is always the best ones who drop out because they are the only ones who realize when their time is being wasted. The student of a little lower grade can be fooled and made to think he is getting a lot, but the "A grade" student who is working under modern system and efficiency in the business world cannot be made to think he is getting what he wants when he has to stand around and watch someone else work or work with someone who can talk about nothing but the last ball game or hunting trip. He is there to work and if conditions are such that he cannot work he will drop out.

In evening school work it will be found, by questioning, that comparatively few of the tradesmen make much use of trade magazines. Their usual reply is "They're nothing but ads." As a counter to this attitude the instructor can make a list each week, of good articles to read; that is, articles which are pertinent and of such a character that the class will understand them. Then take about fifteen minutes of the period for the discussion of magazine articles and show how they may be applied to everyday problems. It is surprising how such discussions will liven up a class and the men soon begin to realize that their plant or job is not the only one in existence. There is much to be learned from the other fellow. A large amount of this valuable material can be thrown on the screen with an opaque lantern.

The projection of a standard blue print or instruction card which comes with an A. C. starting compensator, generator, switchboard or some such apparatus will bring the class to their feet in a hurry. They will all have a question to ask about some particular part which bothered them on the last one they installed. In other words, "it's the thing they can take right home and use the next day that will interest them and help them on to a better job." Of course there are some who will come for just one or two subjects and when they get them will quit, but this number will be small. That sort of thing will not cause any serious interruption where the work is organized on a unit plan, and a great many of them will realize that there are several other units which will be of just as much use to them as the ones they came for and stay on.

An evening school should be organized with a view of its being as instrumental as possible in helping its students to improve their station in life and to live it more fully. If that thought is kept foremost in the minds of the instructors, with no effort spared that would help make it such, and to enlist the cooperation of the employers, it will have no trouble in holding classes. The trouble will come in trying to provide accommodations for them all.

Some Suggestions for Clothing Courses in 1921

Janet Cation Thurston and Rosamond C. Cook

I WISH every home economics teacher might read the article entitled "Let's Can the Coat Hanger," in the March, 1920, number of the INDUSTRIAL ARTS magazine. Then I should want her to go one step further and see what were the "coat hangers" in her course of study.

For two years I did extension work with women, and during that time I had a chance to find out what women did not know about sewing. Many times I wondered whether the next generation of women, notwithstanding their instruction in the schools, were going to be any better prepared to meet their clothing needs.

It seems to me that a pupil with a well rounded clothing education *may* know something about hand work, *but should know much* of clothing construction and have a thoro knowledge of the sewing machine, including the attachments. Why do the majority of teachers persist in starting on hand work as a prerequisite for construction work? These are not related and a knowledge of the former does not help one to understand the latter. I taught in one city system where 600 girls took sewing in the grades while forty took it in the high school. As I look back now I realize that I did nothing to help the 560 grade children solve their future problems, for the making of beautiful stitches today will not help them make clothing tomorrow.

It is appalling to find how little many women know about the sewing machine. In my extension work I gave many sewing machine demonstrations in the homes and in schools as well, and I may safely say that nine out of every ten machine belts needed tightening before I could sew. In the schools there are too many kind-hearted manual training teachers and janitors to whom the domestic-art teachers turn over this job, consequently a girl may get thru several years of sewing without knowing how to adjust a belt or that it ever needs adjusting. Pliers, stiletto and hammer should be in every domestic art equipment. Many teachers do not know that there is a tool for fixing machine belts. It is a combination of pliers, cutter and punch, easily handled and convenient, but not a necessity. It is worth investigating, however, since it is a time saver and not expensive.

The cleaning of the machine is extremely important if one is to do efficient work. I have seen machines in homes and schools so clogged with gummed oil that I could scarcely turn a screw, and the mechanism and the pan underneath were filled with lint and dust. A girl should be taught to respect a sewing machine and to realize that it gives service in proportion to the care it receives. She should care for it as a mechanic cares for his tools. In our home we never had a sharp butcher knife, and it is only since I have been married that I have learned the reason why. We did not know how to care for sharp-edged tools. My husband gasps when he sees the use I make of my fine set of knives, for he has been taught the care of tools by a tool-loving father. What a shame that I did not get this knowledge earlier so that I might have been passing it along the line in all of my former domestic-science classes.

Fig. 1. Home-made Dress. Cost $3.50. Made in 18 hours. Could not be duplicated in ready made under $18.00.

I recently called on one of my Maryland neighbors, the mother of eight little girls and one boy, and found her laboriously mending her son's trousers. I volunteered to show her an easy method of darning on the machine, but she replied, "My machine is threaded in white this week, for I am making Easter dresses for the six youngest." That woman with her large family of little ones had never learned to thread the machine automatically. The girls who learn to use the machine in the grades are not going to have that difficulty when they grow up, for we know that they can be taught to

wind a bobbin and thread both top and shuttle in five minutes, while threading alone need take but two minutes.

In past years I have been guilty of taking machine attachments out of the drawers of the school machines, so they would not get mixed or lost. Now I am convinced that machine attachments should be taught in any grade wherever there is occasion for their use. I was skeptical about this until I saw how a class of sixth grade girls used the binder in finishing the edges of their aprons, and binding them beautifully too! There is also a decided gain in time thru the use of machine attachments. In the past we have paid too little attention to the time element in sewing, and we have allowed the project to drag along and the child's interest usually has diminished accordingly.

I referred before to the machine darning. It is a splendid method to use in mending sheets, towels, table linen, and tears in clothing. It is done by merely tying up the presser foot of the machine so that it is about one sixteenth of an inch from the feed, and turning the stitch regulator to the finest stitch possible. This allows the work to be drawn back and forth or from side to side as the worker desires. The hole is filled in by putting in rows of stitching close together, first lengthwise then crosswise.

[1]See Bulletin, "Short Cuts in Sewing," Extension Department, Iowa State College, Ames, Iowa.

As I have heard many a tired mother remark when she saw machine darning, "What wouldn't I give to have known that ten years ago," I often think how fine it would be for the grade child to take home such information to the mother who does not have the opportunity of learning the new things in sewing. Hand darning should be taught, not in one grade but in each grade. I recall in one city where I gave a short course, one very young mother asking me to teach her how to darn. Knowing that she had had domestic-art training in the schools I asked, "Didn't you learn to darn in school?"

"It was taught in the seventh grade," she replied, "but I was absent that day."

One teacher at least is requiring the girls to darn one pair of stockings each week in order to form the habit of thinking of such things for themselves and of helping in the work involved in these necessary repairs.

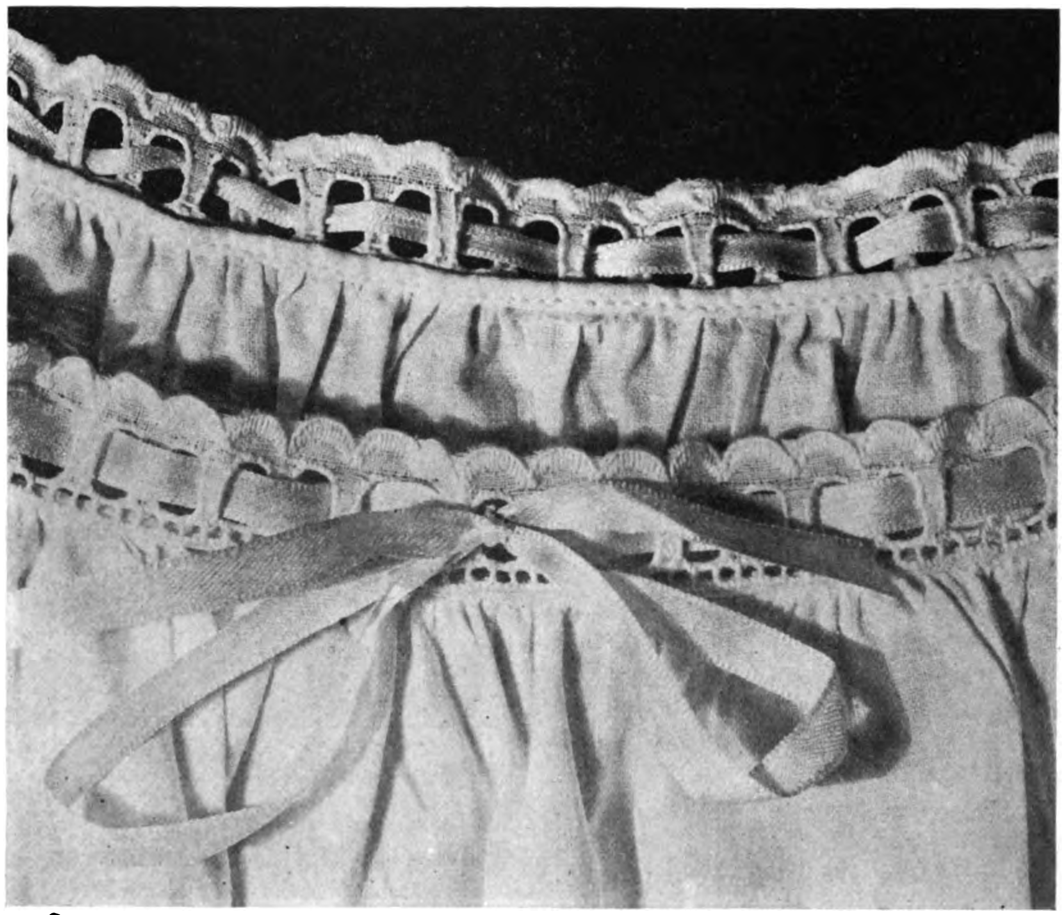


Fig. 2. Ready made nightgown, showing the good quality which was bought for $2.00.

Where must sewing reforms begin? I believe the start must be in the teacher training institutions. I made another interesting investigation as I traveled around Iowa, for I incidentally visited about three hundred schools a year. Without being told I could soon tell where a teacher had her training. If she were making a combination sewing bag and apron I knew she came from one school, and a certain type of cooking apron gave me the clue that that teacher was from another school as the apron was a model always used

by another of our Iowa teacher training schools. I used to regret that a teacher should continue, year after year, using the same models that she used when she left her training school, never realizing that because a school used a certain problem one year that it would continue to use that problem.

Anyone who knows about teacher training knows that we are always searching for new and better problems. I know of one domestic-art teacher who took her training by studying twelve summers in a big university. In her first position she went back to her first note books to get material for high school classes and started out with a superannuated draft for a middy blouse. When questioned about it she said, "Indeed it is all right, for I got this draft at the University of X." This happened less than five years ago in one of our prominent school systems.

The young teacher should not receive all the blame, however, for I have seen her in the smaller schools with a schedule that included history, accounting, business arithmetic, and geometry, all of these besides her home-economics courses, subjects she knew little about and must prepare herself for daily. Consequently is it any wonder that she lets down and resorts to her old note books for home-economics material? Would the more experienced of us do any better?

It is to be taken for granted that a teacher training institution will send out properly trained teachers. Such a teacher will have had much training in the use of the sewing machine with its attachments, also its care and repair. I know of one school where every Friday some class is made responsible for the cleaning and oiling of the machines. I know of another where at the end of the summer school an instructor asked, "Which class will be responsible for the final cleaning of the machines?" and the answer she received was, "Nobody needs to be; the machine company will send a man to do it before school opens in the fall." It is not difficult to know which school is sending out the best prepared teachers, nor creating the best attitude on a point that means so much to the student, not to mention the saving in expense to the school systems in which these teachers are placed.

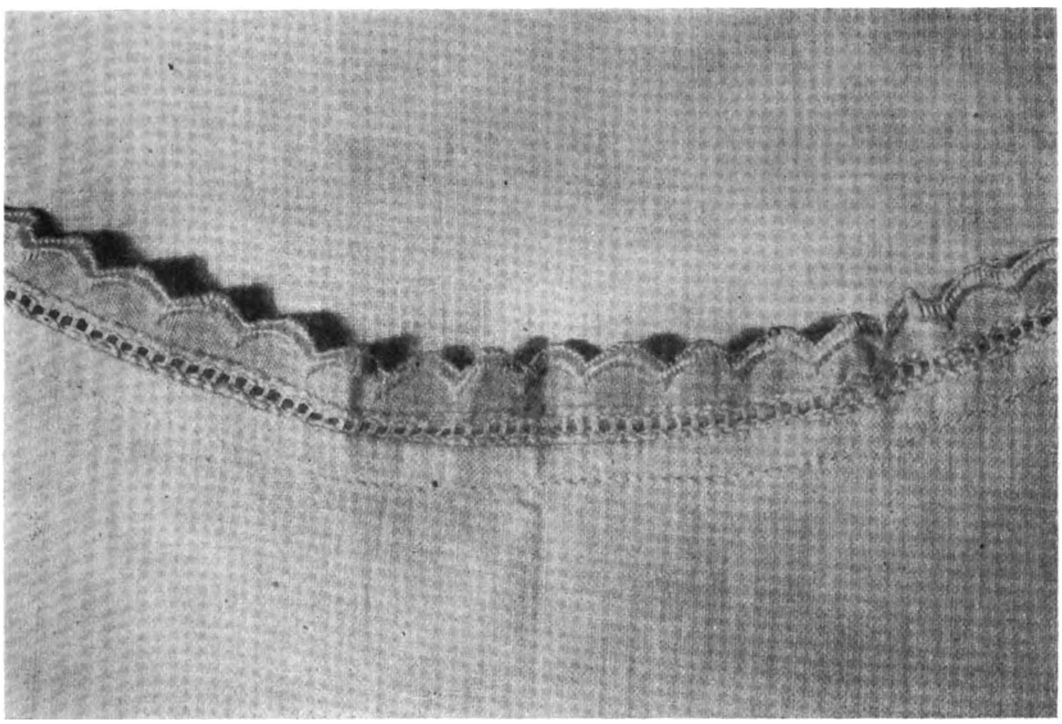


Fig. 3. Home made nightgown. Notice firm material, good embroidery edge.

Since in many cities classes are offered for girls who work and for women in the home, it is essential that a teacher know as much as possible about short cuts in sewing. A teacher can learn many of them in school, but she must be able to feel responsible for growth after she leaves her training school. It is most advantageous for a teacher to spend part of her vacation in attending a trade school or working with a good dressmaker. Why do not more teachers take the attitude that other professional people do? I was talking with a young dentist recently and he said he did not feel as if he could miss his weekly study club, altho he had been out of college only two years.

The teacher training institutions could do much for their teachers and for home economics work in general if they did follow-up work with an occasional letter with suggestions of new problems and better methods, or a news letter similar to those sent out by the extension departments of our state colleges, telling how teachers in the field are attacking certain problems and with what results.

I recall hearing a noted domestic science professor tell of visiting over twenty schools in a large city system

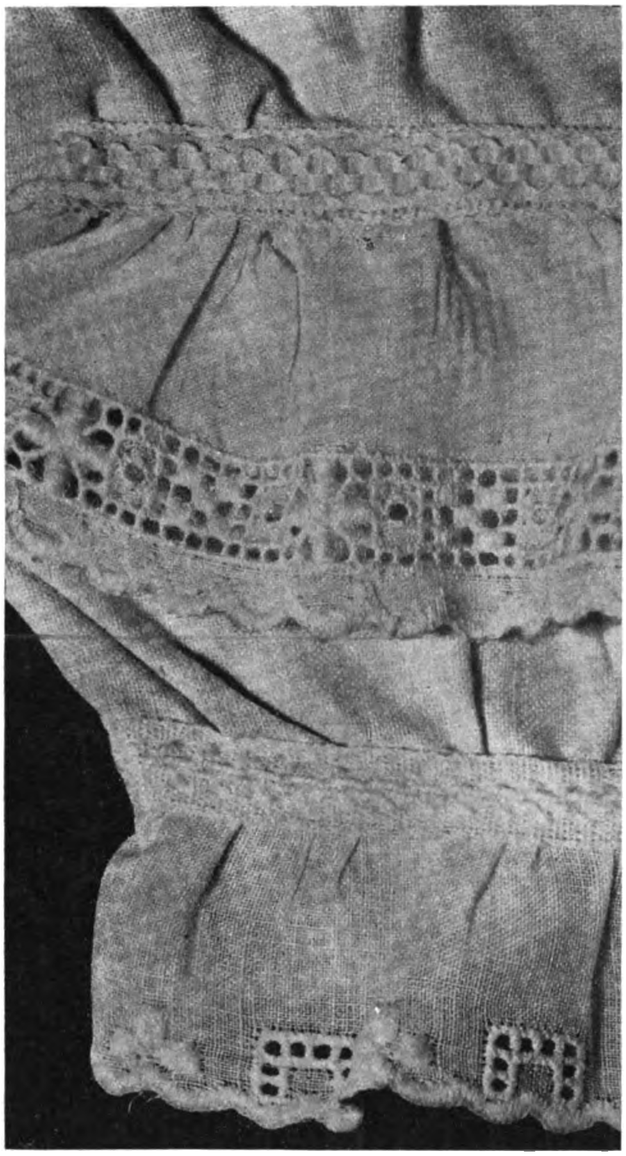


Fig. 4. Home made drawers for children. (Top.) Ready made drawers for children. (Bottom.) Both garments cost the same price. Good quality of muslin and embroidery in each.

the week peanut cookies were being taught. "Why peanut cookies?" she asked in each instance. The most frequent reply was, "Because it is lesson 27." In no case was there any reference to why peanut cookies were chosen or a comparison of the home-made as to price or quality with the commercial product.

We must take up the "whys" in clothing. What things should be made at home and what things will it pay to buy ready-made. Simple comparisons of value may be made even in the grades, but in high schools, colleges, and evening schools much stress should be put on this important phase of the work.

The following study was worked out by Miss Rosamond C. Cook of Iowa State College and shows one way of approaching the subject:

A woman recently duplicated a $2.50 ready-made dress for $1.72. She saved 72 cents but worked eight hours. The value of her time was nine cents per hour. Being a busy farm woman, she decided that it would be more economical to buy the ready-made dress and spend her time in more remunerative farm work. On the other hand, a business woman made a nightgown by machine in an hour and a half, duplicating a $2.75 garment, while the materials cost $2. She therefore earned the equivalent of fifty cents per hour and used time in which she otherwise would not have been earning money. This, however, is only one consideration.

In times past, when there was a wide range of materials at low cost, a woman could buy either materials or ready-made garments without the careful thought that is necessary under present conditions.

Economists who are working on the problem of the division of the income tell us that, altho we must increase the per cent we spend for some things, we cannot allow a proportionate increase for everything, and clothing is one item on which we can economize. Since the family clothing bill should still not exceed 20 per cent of the income and most clothing has increased in price at least 100 per cent the housekeeper has a real problem before her.

The woman who is spending every penny to the best advantage will need to consider whether it will pay her to buy material and make a garment either with or

Fig. 5. A duplicate of a $2.50 ready made dress on which 72c was saved.

without the help of a seamstress, or whether it will be more to her advantage to buy the garment ready-made. She will need to find out not only the value of her time, but will investigate the following points in order to make an intelligent decision: First, cost of each; additional cost for seamstress for home-made, or alterations for the ready-made; time spent in making or selecting a garment; appearance of the finished product.

Advantages of Home-Made Garments.

Many people do not add to the cost of material the value of findings that are on hand, trimmings that are bought at a later date, or unnecessary car fare to purchase forgotten supplies.

When a seamstress is employed, the cost of her services must of course be added to the cost of the garment. The initial cost may be reduced if the pattern is purchased and altered before the material is bought. If material is one dollar per yard, a quarter of a yard saved would buy silk thread and fasteners.

Further thought would include whether the width of the material would allow the most economical cutting. For example, one might be ahead financially by paying a larger price for 54-inch goods, instead of using 42-inch at a lesser price, to say nothing of the time saved in making piecings, and the appearance of the finished garment.

Does the material have a right and wrong side? An up and a down? Will the design match without waste of material? are questions which should be answered before buying.

On some garments there is such a slight difference between the price of the ready-made and the home-made that it does not pay to spend the time in making. These are usually the garments in which there is no great variety of either design or quality of material and which do not change from season to season.

One woman found that she could buy children's drawers for the same price as the material. On sheets and pillow cases there is practically no difference. Men's shirts and night shirts should also be considered in this class.

On the other hand, garments in which there is a great variety of design and material as well as a seasonal change can usually be duplicated for at least one-half the cost. The gingham dress shown in the illustration was made at a cost of $3.50, and probably could not have been duplicated in the same quality of material under $18. Approximately eighteen hours or a little over two days were spent in the making. A business woman who recently made a wool Jersey dress for a total cost of $12 concluded that she had earned $25 in the two days spent in making, when she found that it compared favorably in style and quality with a $37.50 garment purchased by a friend. From these illustrations it is plainly seen that the wise consumer will make some comparisons of her own to be sure that she is making garments that will pay her a fair profit for her time. She should assure herself, however, that she is making the garment in the least possible time.

Many women do not realize that much basting may be eliminated by pinning and pressing. The sewing machine attachments are time savers also, if one will become familiar with them. Then the worker should think the problem thru and arrange the work in such order

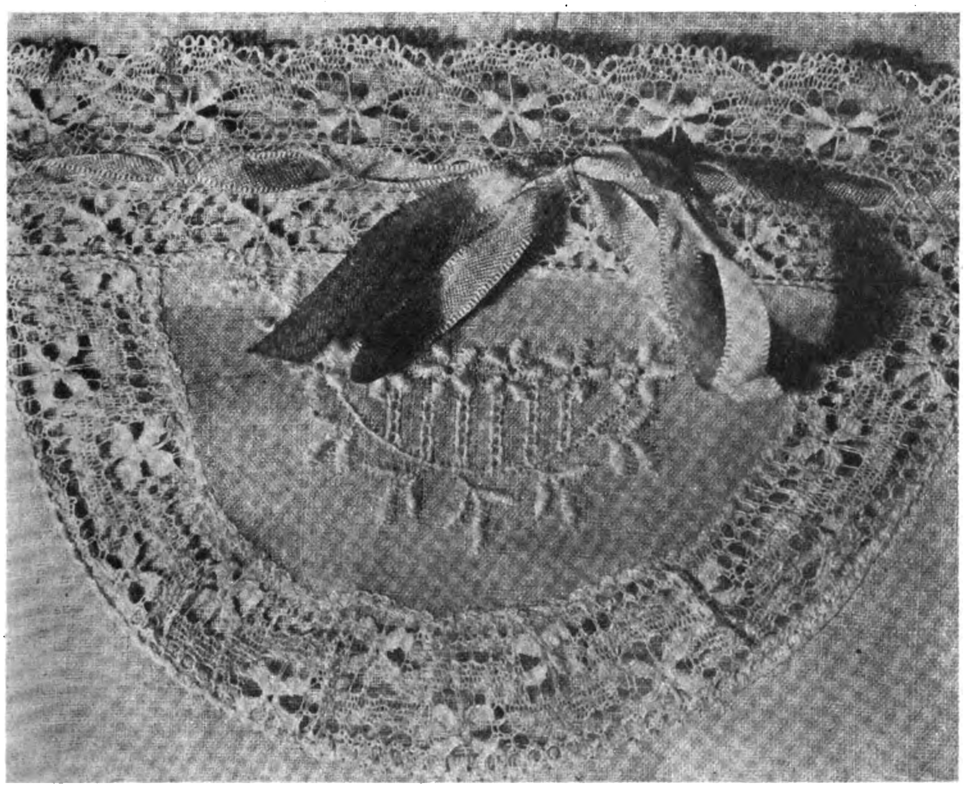


Fig. 7. Ready made nightgown. Coarse material, cheap lace, poorly sewed in.

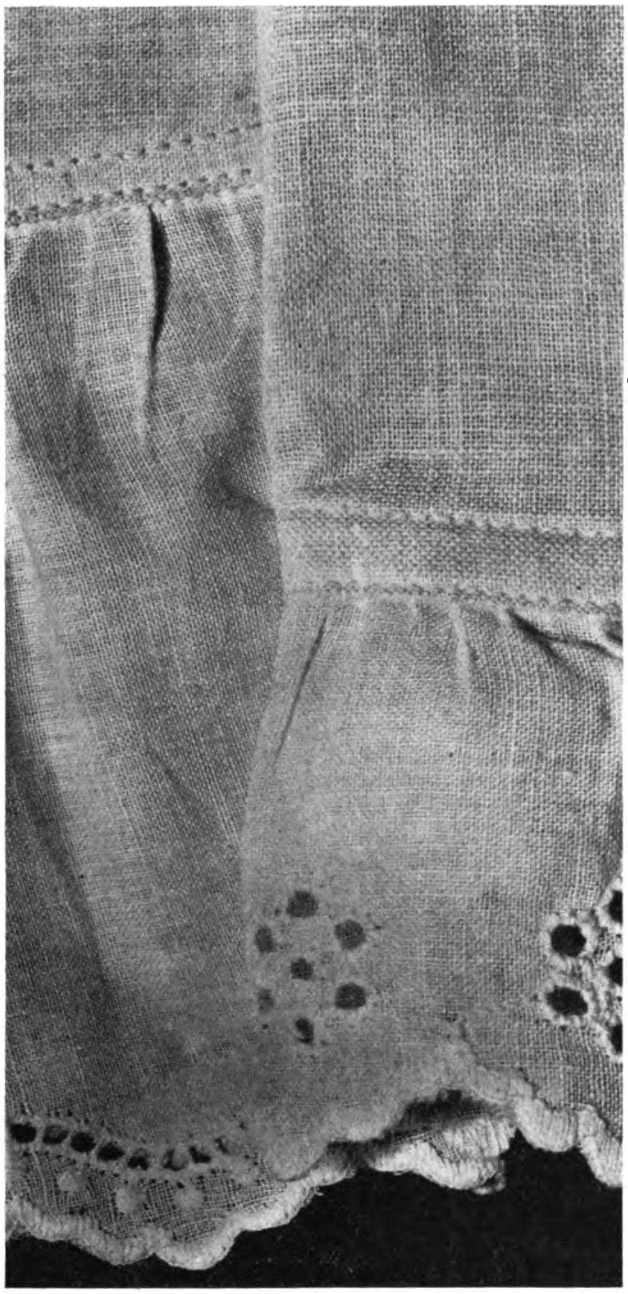


Fig. 6. Detail of child's Princess Slips, showing difference in quality of material and trimming. Home made garments cost eight cents less, but will wear longer and look better than ready made.

that time is not wasted in other ways. For example, in making children's drawers or bloomers, put on the placket and finish the bottom of the leg before the leg seam is made, since it is much easier than after the leg seams are sewed up. In making nightgowns, put the fitted yoke or other finish on the neck and finish the bottom of the kimono sleeve before sewing the underarm seams. In a skirt with a front plait, finish the plait before sewing up the side seams. Stitch on pockets also before putting the parts of the garment together.

One great advantage of the home-made garment is that the growth of the child can be anticipated and provided for by such means as tucks or wide hems. Material will probably be left which can be used to good advantage for the addition of cuffs to worn or short sleeves or to replace the belt that has grown too tight.

The finished product is judged by the style of the garment, the quality of workmanship, the fit, the material, and the unusual finishes. Some people have the knack of making garments that meet these requirements, with others it may be acquired by close observation of styles in the magazines, studying well-dressed people to discover what it is that makes them look attractive and thru asking the advice of experts in such matters.

Buying Ready-Made Garments.

The problem of buying a ready-made garment is to find a garment that will meet one's needs and suit one's tastes, as well as come within the stipulated sum which one can afford to pay. The price paid for the garment does not cover the initial expense, for the alterations must be included. These alterations may be done at the store with additional charges, or at home when the purchaser's time should be computed and added. Even if the alterations are made in the store, buttons and hooks must be securely fastened, which will take time. Unnecessary time is often spent in buying on account of the habit that many women have of feeling that they must look everywhere before they buy, notwithstanding the fact that they frequently see the thing that suits them in the first store and return to it in the end. If the consumer puts a value on the time spent in making a garment, should she not make the same point in the selection of the ready-made garments?

In considering the workmanship of the ready-made garment, some of the points to be observed are:

Are the seams stitched deeply enough so they will not pull out? If there is a figure in the material, has it been matched in the cutting? Is lace or embroidery sewed on in such a way that it will not pull out? Are the plaits laid straight so they will hang properly and be pressed easily? More important still, have all the parts been cut correctly or has the manufacturer in his desire to economize on the material, shifted the pattern so that the parts which should have been on the straight of the goods are slightly bias? Is the material of the same quality thruout? The writer, during the past sum-

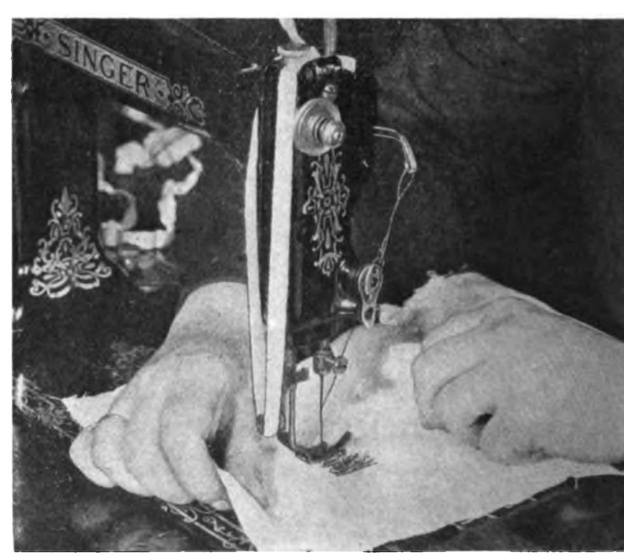


Fig. 8. Machine foot tied up for darning.

mer, saw a crepe de chine teddy that had a piece set in the back, and altho the price was around eight dollars and the garment had been purchased from a reliable house, the set-in piece was of very inferior goods. The inferior goods was not only in such a place that the hardest wear would come upon it, but it was in such a place that the purchaser would not be likely to discover it at the time of buying, the very thing that happened in this case. Are vests and collars easily removed for frequent laundering? A busy woman recently spent an entire day in removing a vest from a dress and making it detachable.

The quality of material in a ready-made dress is important. One must be a good judge of materials in buying ready-made because one does not have a chance to make the tests as in buying from the piece. One can at least avoid undergarments made of material so filled with starch that they will look like cheesecloth after the first washing. Look for a good firm weave, avoid materials that have a sleazy appearance.

An advantage of the ready-made over the home-made is that one has the opportunity of seeing the garment in a finished state, while in the home-made one can see it only in imagination. However, one's judgment needs to be trained to recognize the right thing in the ready-made as well as in the home-made. A well-dressed woman who buys for long service avoids extreme styles in either line, color, or trimming.

Besides the material in the garment one should notice the quality of linings and trimmings and compare them with the quality which would be purchased for a home-made garment. One can readily recall garments overtrimmed with cheap lace, or coarse, badly made embroidery when a simple firm edge would not only look better but wear better. Large stores usually carry garments trimmed with well made embroidery for the discriminating customer who makes her wants known.

It is certainly true that the designers of ready-made clothing use many interesting touches such as hemstitching, bound buttonholes used in unique ways, odd and attractive pockets, cable stitching, etc., which add much to the chic appearance of the garment.

It is only fair to add, however, that the commercial patterns are put out by firms who pride themselves upon the qualifications of the artists they employ, and whose training is the same in both cases. Moreover, with the exception of the machine embroidery there is scarcely a thing that the home worker cannot have for her garment if she is wide awake and alert. Hemstitching can be had for a few cents a yard, bound buttonholes and set-in pockets are mere matters of technique, and magazines give the methods of procedure frequently. Cable stitching may be made on any machine by winding the bobbin with the heavy thread and loosening the upper tension. Lengthen the stitch as well. The work is stitched on the wrong side, thus throwing the heavy embroidery thread upon the right side. These things all take forethought in the planning rather than special ability in the doing.

Fig. 9. Ready made nightgown. Costing almost twice as much as home made.

In order to put the problem of the comparison of values in a concrete way very few illustrations have been given. These will not meet the needs of every one but should at least show the thoughtful consumer the value of an investigation for herself. The individual problems will differ greatly, but every woman should discover whether she is spending *her* time and money to the best advantage. Her final decision in the matter can only be a fair one when she has based it on intelligent experiments of her own.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

TESTS AND MEASUREMENTS.

There is nothing at all in the sane application of tests and measurements that should disturb the teachers in the public schools or make their work more difficult. Indeed, under a wise and skilful administration of such devices, the teachers' problems should be greatly simplified.

The greatest dangers that will arise in connection with the aptitude and intelligence tests are sure to be due to the blunders and over-enthusiasm of the sensational novice, who accepts the findings of the present imperfectly devised tests and scales as the ultimate and infallible truth. Such persons often desire to appear learned in their familiarity with certain mysterious forces and practices.

As a matter of fact, those who have had most to do with the development and use of mental tests and scales and hence who know most about their significance, make absolutely no claim for their infallibility. They do maintain the correctness of the principles upon which by means of the tests properly applied under natural conditions and properly interpreted by competent people, children may be classified into rather distinct groups as regards inherent capacities and aptitudes.

Furthermore, in the main it may be said that the skilful use and interpretation of tests tend to verify the matured judgment of competent teachers formed from experience with the children in question. There are, of course, cases that vary widely from this statement. At best, the group tests of intelligence simply raise questions for further investigation concerning the intelligence and classification of certain pupils, who may appear in the tests, to be either above or below the normal of intelligence. If the results of such tests are placed at the disposal of skilful teachers who are in immediate touch with the children involved, they may become a source of very great aid to the teachers in solving some of their difficult problems. Likewise, they may bring relief and profit to numerous children whose improper classification and instruction they help to discover.

The teachers and the children of the schools should be freed from the imposition of those who study a few lessons by correspondence or who take a six weeks' course in a summer school, and thus fully equipped swoop down upon the community with their intellectual yard sticks.

By all means, let's have all that scientific research can devise in the matter of intelligence and aptitude ratings. Let's use the tests with a full understanding of their purpose and their significance and with an appreciation of their limitations. It is unfair to the children, the tests, and those who have developed the tests to use such devices in an unscientific way, to interpret the results without due consideration of all the elements and influences involved, or to make radical changes or reclassifications on the strength of the group tests without further investigation and verification. Properly used and interpreted, the aptitude and intelligence tests should become one of the greatest of modern educational aids.

THE SPRING REVIVAL.

Again the season approaches for the human animal to come out of his winter seclusion, take a deep, fresh breath of the south wind, bask in the sunshine, and watch things grow. If the industrial art teacher has enough influence and sets a good example, he may inspire a little vocational interest and activity in helping things grow to some definite purpose and plan.

Things will grow with no help. Nature provides the materials and conditions of growth. Man shapes and directs the forces of nature to his own purpose, or takes the haphazard results of nature as they come. The haphazard products of nature will no longer satisfy man's needs. There are too many of us to live off the ungoverned bounties of nature, or perhaps we are too luxurious in our habits of living to be satisfied with what we may harvest from untilled nature. We may be educated to appreciate the beauties of nature, but to sustain ourselves creditably we must do more than watch nature grow and become enthused over the beauties of nature. We have learned that another winter will follow this one and that unless something is done, nature will take another rest and our supplies will run short.

In spite of past experience, in spite of hard winters, there will be some who still advocate art without industry and industry without art. The revival of labor and learning, industry and art, has not yet reached the consciousness of all who have charge of education.

To some it is still adequate for the schools to develop the mind and senses to appreciate fine conditions without the skill to produce them. To others the skill of production is adequate, and appreciation is to be acquired thru experience with material things, as it may.

To the industrial art teacher, Spring is not only a revival of the activities of nature, to be enjoyed by taking a deep breath of the south wind and absorbing the sunshine. Spring is the invitation to direct the forces of nature so that her bounties may be enjoyed the whole year thru, and to develop the mind so that appreciation of those bounties will make every season delightful.

COOPERATION.

It would seem unnecessary to urge cooperative effort at a time when organizations have multiplied as at present, for organization is but the endeavor to secure

cooperation of effort to do some particular thing. However, organization so often results in a few doing the work of many, rather than a fair division of responsibility.

The true leader does not stop with the machinery of organization. Unlike a mechanical device, every part of which is designed to perform a very limited function, the human organization must be composed of individuals, each having the interests, aspirations and conceptions of the whole organization. No capable member of an organization is satisfied to be a cog in the wheel. Our democratic standards cannot tolerate mechanical organization with a dominant centralized authority which considers the individual member as a mere name on the roster, to be used or neglected as authority may dictate. It is in this sense that democracy means individual opportunity to cooperate.

Cooperate we must! Organization should help us to the opportunity to cooperate. The school organization should be composed of the whole commonwealth. Citizens and teachers must cooperate or the schools will be but a few people's business and will represent the efforts and ambition of a few individuals.

Education, unlike some other human processes, may not be accomplished once for all and finally. It is a continuous development that applies to each person individually and to each generation in turn.

The teacher whose work is done when his class is dismissed is but a cog in the machine. The teacher who knows nothing of the whole educational process and cares nothing for other subjects than his own is not likely to be an effective teacher of his own subject.

The teacher of the industrial arts is especially subject to unfortunate isolation of his work and himself from other school activities. His subject has not yet become an integral part of the school curriculum in many communities. He can do much to make it so by taking active interest in the teachers and teaching of other subjects and in finding cooperation between his instruction and the instruction in other subjects.

No subject offers greater opportunity for cooperation of the school with activities of the community than industrial arts. The industrial arts teacher may even become a leader of industrial activity in his community and a valuable agent in correlating school activities and interests with the interests of the community.

TRADE EXPERIENCE.

So MUCH emphasis has been placed upon trade, or "practical" experience, that in many cases, all one has to do in order to secure a position as teacher of a shop subject is to assert that he has spent so many years "in the trade." The fact that a man has had six years of experience in a factory in this day of highly specialized shop procedures may be entirely without significance so far as teaching a trade is concerned.

Long experience as an operator of a sander in a furniture factory offers absolutely no preparation for teaching wood working in grade or high schools. Operating a monotype caster or a linotype machine or a platen press as a feeder is of itself no evidence whatever that such an operator is qualified to teach printing.

How much of a trade shall one know before he is a tradesman? Just what is the printing trade in these days? Shall a printing tradesman be expected to be skilled in all branches of this trade? Or shall the printing business be divided up into various groups of activities, each group of which shall be regarded as a trade?

The present terminology is very loose and inexact. The present scheme of industry renders it almost impossible to become a tradesman in the old journeyman sense. When teachers are employed, therefore, the fact that they have had so many years of trade experience should not be regarded as conclusive evidence of their ability to handle shop instruction.

The very least that should in reason be expected of those who come from the trades into the school work, is that their trade experience shall have been of such character as to furnish direct and specific training in the particular line of work which they propose to teach.

SYMBOLISM AND ART.

Art cannot dispense with symbolism; as the letters on this page convey thoughts to the mind, so do the things of this world, organized into a language of symbols, speak to the soul thru art. But in the building of our towers of Babel, again mankind is stricken with a confusion of tongues. Art has no *common language;* its symbols are no longer valid or are no longer understood. This is a condition for which materialism has no remedy, for the reason that materialism sees always the pattern but never that which the pattern represents. We must become *spiritually* illumined before we can read nature truly, and recreate, from such a reading, fresh and universal symbols for art. This is a task beyond the power of our sad generation, enchained by negative thinking, overshadowed by war, but we can at least glimpse the nature of the reaction between the mystic consciousness and the things of this world which will produce a new language of symbols. The mystic consciousness looks upon nature as an arras embroidered over with symbols of the things it conceals from view. We are ourselves symbols, dwelling in a world of symbols—a world many times removed from that ultimate reality to which all things bear figurative witness; the commonest thing has yet some mystic meaning, and ugliness and vulgarity exist only in the unillumined mind.—*Claude Bragdon.*

O brother, we must if possible resuscitate some soul and conscience in us, exchange our dilettantisms for sincerities, our dead hearts of stone for living hearts of flesh. Then shall we discern, not one thing, but, in clearer or dimmer sequence, a whole endless host of things that can be done. *Do* the first of these: do it; the second will have become clearer, doabler; the second, third and three-thousandth will then have begun to be possible for us.—*Thomas Carlyle.*

CHAIR BOTTOMS OF FLAT REED

Louis J. Haas, Director of Therapeutic Occupations, Bloomingdale Hospital, White Plains, N. Y.

BECAUSE of the variety of needs he must meet, the Occupational Therapist is ever on the lookout for crafts or modifications of crafts which he may add to his list and use. Some of these modifications of old and quite well organized crafts are often very interesting and may be of value to others. One of the crafts that has been of value to the occupational worker is the caning of chairs. This craft except as kept alive by the workers with the blind and in certain hospitals having occupational departments, has almost become a lost art.

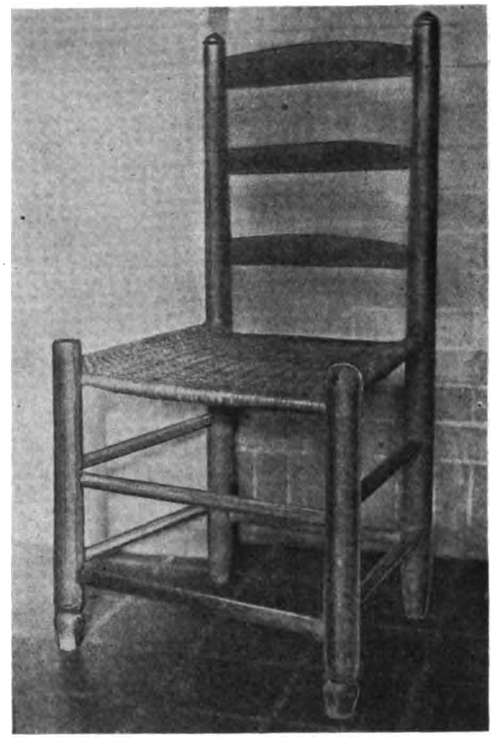
A desire to produce a suitable bottom for chairs using some more easily procured material than rush led to the development of the bottom made of flat, split reed. This is an original modification of the close-woven cane bottom. It has the decided advantage of being a single fabric instead of a double one. The coarse, flat reed comes in good lengths and is more convenient to use, than either rush or wood splints. It produces a fabric that harmonizes well with the usual type of chair designed for rush bottoms. The bottoms made with flat, split reed are both durable and comfortably flexible. The texture of the reed lends itself readily to pleasing tones produced with wood stains.

To start work, the chair is placed on the table, and fastened securely so as to leave both the worker's hands free. A number of strands of flat split reed are rolled into rings and put to soak. The worker should have at hand a tack hammer, some fine wire brads about ⅜" long with large flat heads, and a large paper clip to which he may attach a two-pound weight. The paper clip with weight attached is used to retain the tension, as illustrated in the drawing C, plate No. 2, should it be necessary at any time to leave the work while the first stage is in progress.

The reed being pliable the first stage is begun thus: Mark the center of the chair upon the seat rails, front and back. Pass the strand of reed around the back rail at the center and pull forward, balancing the length of the reed above and below the rail. Tack it to the rail, driving the brad thru the center of the reed and into the under side of the rail. Take half of the strand above the seat rail and carry it forward and over the front seat rail at its center. Pull the strand quite taut, taking the strand down and around the rail, coming up on the inside of the rail and to the left of the taut strand. The reed is drawn close to the inside of the rail and then passed over the strand to the right and down, thus completely reversing its direction as illustrated at B, drawing No. 1 and in drawing No. 2, plate No. 1. It then passes around under the rail, coming up on the front side, continuing thus until three complete wraps have been made around the front rail, after the direction of the strand has been reversed.

Care should be taken to have these three wraps fit close up to the initial strand or warp strand, as well as fitting closely to each other. Then bring the strand around and over the top of the front rail once more, but this time just carrying it up and over the rail and then on, up to, and over the top of the back rail, at a point just two widths of reed from the initial warp strand. Take the strand around and up on the inside of the rail and to the left of the warp strand just laid down, taking every care to pull the warp strand taut. Continue to the left with the reed thus, until two complete wraps use up the space left between the strands for this purpose.

Upon coming up on the inside of the back rail for the starting of the third wrap, carry the reed diagonally across to the last laid strand, over it, and down, thus reversing its direction. See drawing, B, Plate, No. 2. Make



THE CHAIR AS CANED BY THE AUTHOR'S METHOD.

two complete wraps around the back rail, close up to the last warp strand on its right, and on coming up for the third wrap, take the strand across to the front rail. Take the strand over the front rail to allow sufficient room for three spacing wraps to its left, between it and the last laid warp strand. After making the three spacing wraps on coming up on the inside of the rail, pass diagonally to warp strand just laid, pass over it, and down. Having reversed the motion, make the necessary three spacing wraps, and carry the strand over to the back rail, spacing and reversing as explained, continuing thus until the right-hand side of the chair is reached. Whenever it is necessary to stop the work for a few moments the tension may be retained by snapping the paper clip with weight, to the reed, as illustrated in drawing C, Plate, No. 2.

It will be necessary, as the work proceeds, to add new strands. This is best accomplished in this manner: When the exhausted strand has been passed over the rail, attach the weight to retain its tension, and then place the new strand in a diagonal position on the inside of the rail facing in the direction of the wrapping, tacking in place with one brad placed under the warp strand. Now take the exhausted strand and make two spacing wraps, passing over the new strand, letting the third wrap pass under the new strand, then cut off the surplus of the exhausted strand as shown in drawing 3, Plate, No. 1. The new strand is now wrapped over the old one as shown in drawing 4, Plate, No. 1, and a tack is driven thru both strands on the under side of the rail. Work now proceeds as before.

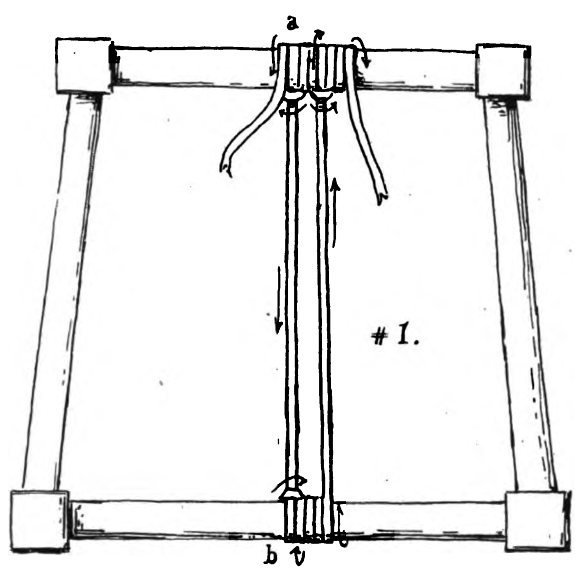
It will be noted that by this method of splicing a new strand, the ends of both strands are wrapped in. Both the tacking to, and the friction of the reed upon the chair rail, holds the two ends firmly in place. This form of splicing may be modified to meet the needs of this stage of the weaving, as well as those of the next stage. The left side of the chair bottom is warped thus: Take the under half of the original strand, bring it up on the inside of the rail to the right of the warp strand, carrying it over, and down on the right side and then make two

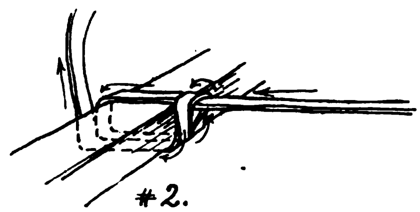
spacing wraps before taking it to the front rail. Drawing 2, Plate No. 1 illustrates this reverse. Now the warp strand passes over the front rail at a point just three wraps from the central warp strand, and the spacing wraps are made to its right. When the spacing wraps have been made, the strand passes to the left, over the warp strand, and down, to make the reverse. The work then proceeds in the manner described above with but this change, that the strands are being laid on the rails moving to the left of the center, instead of to the right.

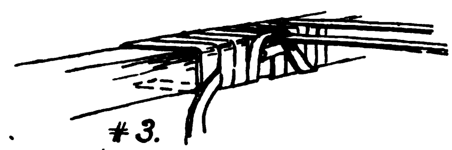
When the left side of the chair bottom has been reached, it will be noted that the strands end on one side at the back rail and on the other side at the front rail. The next stage of the weaving should begin at the front and work toward the back. Therefore, the surplus of the warp strand which finishes at the front rail may be used. both his hands free for the weaving which proceeds best if one hand is kept under the chair and the other above the chair, passing the end of the reed up and down without delay.

Care must be taken to start the reed so that it will not be twisted during the weaving. The chair caner's habit of pulling the reed thru the fingers until its end is reached, is the best habit to form, and that coupled with the use of a small amount of the end of the reed, will eliminate twisting mistakes. When the strands are pulled taut as much tension should be given them as they will stand; this is necessary in this stage as in the preceding one. The strand should only be used when quite pliable and when a strand gets dry while using, it should be softened with a sponge and warm water.

Reed seems to expand principally in thickness and







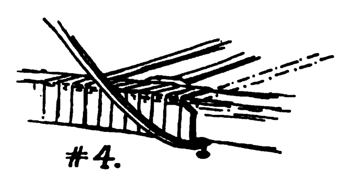


Plate No. 1.

Drawing A, Plate No. 2 shows that the strand finishes at the front on the right side of this chair bottom. If another warp strand had been needed, it would have simply reversed this. After the three spacing wraps have been made between this warp strand and the preceding one and the reverse has been made, the remaining space on the front rail is wrapped and then the strand is passed under the front rail, inside of the chair leg, under the side rail, out, up, and over it and the reed is transformed, or becomes a woof strand. The strand is kept as close to the chair leg as possible, carried over the nearest warp strand and under the next, alternating thus, over and under until the other side of the chair is reached. The strand is pulled taut, passed over and around the side rail and kept close to the chair leg.

It now becomes necessary to reverse the strand. This is accomplished as follows: hold the strand taut with the thumb upon the top of the rail and the fingers underneath; pass the end of the strand up between the woof strand and the front of the chair, pull up taut close to the side rail, pass the strand over the woof thread towards the back of the chair and hold down hard upon the woof strand with the thumb of the left hand, which has been released from the former operation. This will keep the strand from slipping when it is passed down and under the side rail to reverse its motion. The reversed strand now comes out, up and over the rail, being held taut with the thumb and fingers above and below the rail, while it is woven over and under several of the proper warp strands. As soon as this is done, and the strands are pulled taut it will hold its tension at the side rail just left without the aid of the operator's fingers. This leaves width; for this reason the strands unless pulled very taut will when dry become loose on the rails and sag. It is quite possible to pull sound strands of flat reed taut enough to eliminate the possibility of this slackness appearing when the chair bottom becomes dry. None but perfect strands should be used.

When the right-hand side of the chair is reached and the strand has been pulled taut about the side rail, the reverse is made. This reverse is made slightly different from the one just described above for this reason: The drawing A, Plate No. 2, shows that the first strand ended on the left by passing over the last warp strand as well as the side rail; thus it is an advantage to have it tied down between these two points with the band caused by the reversing of the strand. This is not true of the second woof strand; it ends by coming from under the last warp strand. It will be noted that the first woof strand starts on the right by passing over the rail and the warp strand. For the above reason the reverse is made around the first woof strand instead of the one just laid. This reverse is made by passing the strand between the leg of the chair and the first woof strand, up over it, and down between it and the second woof strand. It is then brought under and out and around the rail, and over the first warp strand. Then the weaving proceeds. Thus the reverse on the left is made by passing over the woof strand just laid, while on the right the reverse is always made by passing over the woof strand next preceding the one just laid. This is done in both instances because it divides and pulls down the long section of reed which would otherwise appear; thus eliminating a place in the weaving which would catch buttons and cause much annoyance.

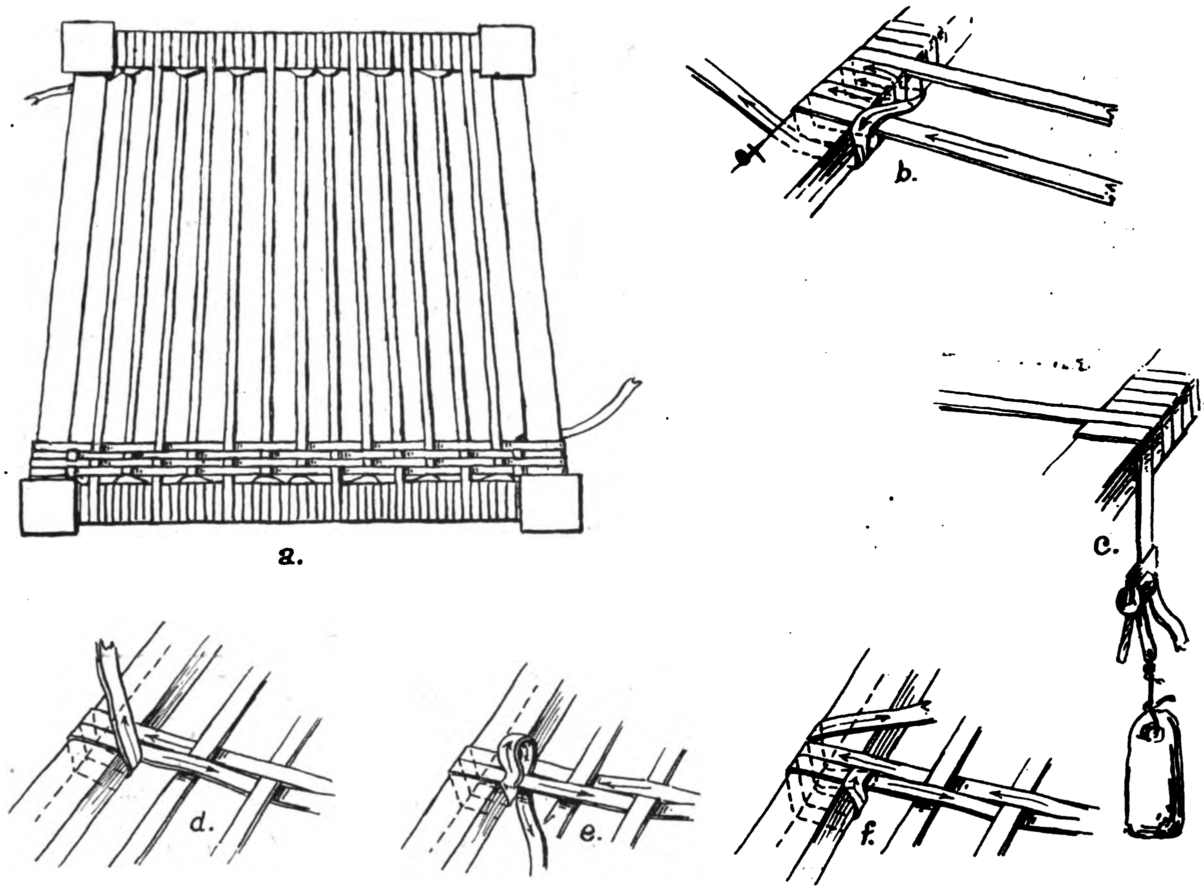


Plate No. 2.

When the last regular woof strand has been placed, it will be found that unless the inside face of the back rail is flush with the inside surface of the legs of the chair, a certain space remains. A filler strand may be woven in, and for this the surplus of both the one warp end and the woof strand may be used, working from both sides towards the middle. When the middle is reached, the two strands may be made to overlap each other about four warp strands, and then cut so that their ends will be covered. This will serve to securely fasten these strands. They should also be tacked to the rails. The space which will also appear in the front of the seat is filled by weaving a short extra strand across the whole width of the bottom. The ends of this strand are passed down close to the legs and held to them from underneath the seat with a tack.

Having finished the weaving, turn the chair upside down, and as an added insurance against slippage, drive a tack thru the strands every two inches into the under side of the four rails of the chair bottom.

While the reed is still moist it is singed with an alcohol lamp to remove the whiskers from the reed. These whiskers are the result of the handling of the reed and can best be removed in this way.

When the seat is thoroly dry it will be found quite flexible and comfortable. Finally it is given a coat of Bridgeport's weathered-green-oak wax finish stain, which brings out the full beauty of the texture of the reed. The stain gives the reed just that delightful tone so much admired in the old rush bottoms, while the texture of the reed fabric harmonizes equally as well as does the rush with this type of chairs.

PROF. C. A. BENNETT ADDRESSES OKLAHOMA CONVENTION.

At a recent convention of Oklahoma art and manual arts teachers, Prof. C. A. Bennett spoke on "Education for Appreciation as Well as Production." According to Prof. Bennett, American life stands at the threshold of a new era which promises much more than material changes. Thru the agencies of new laws affecting social habits, new means of transportation and recreation affecting leisure hours, and new national experiences affecting the spirit and outlook of our country, the time has come for "the leaven of uplift to do its work—for popular culture to come to its own."

The eight-hour day has given the working man eight free hours for recreation and the things which are "more than meat." The movie has translated life and literature into vivid experiences and spread them out before us all. The automobile has brought refreshment of mind and body to the city man and new opportunities for culture and advancement to the country man. The great war with its attending world problems has deepened our love of country and broadened our outlook on the world. All of these new conditions and experiences lay great obligations upon the school to educate for the appreciation of the best things in life.

True culture must therefore be a larger element in education, but the practical side of culture must not be overlooked. The culture which gives appreciation of work well done must be a large part of the program of the manual arts courses in the intermediate and junior high schools, contended Prof. Bennett. "The same civilization, the same life that demands greater vocational efficiency for eight hours a day and for all workers is going to demand a higher cultural level, a finer appreciation of the arts of civilization for all workers during the other eight hours," said Mr. Bennett. Our manual arts courses need to be made richer for cultural reasons, for in these days we must remember that "life is more than meat."

At the Hooker School Annex of the Springfield, Mass., Vocational School a large class of rehabilitation students has been enrolled. The men have shown great interest in the work, particularly in the machine department. A large number also are attending the drafting department. According to the Smith-Sears Act, any man disabled while serving in the army or navy before the world war as well as in the future will be entitled to vocational training on the same basis as those disabled in the world war.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

FORGING A SMALL AX.

H. C. Gibson, Walla Walla, Wash.

The forging of an ax is not as difficult for an advanced pupil, as it may at first appear. But it is of great value in teaching them to weld tool steel to iron, or low-carbon steel. The use of the emery grinder and buffer for finishing is also taught.

For the ax shown, take six inches of ½" x 2½" iron, or soft steel, mark off two inches in center. Use ⅜" fuller and draw one-half of eye, on each side of the marks, leaving the walls 3/16" thick to allow for welding and finishing.

After each side has been fullered to the required size, scarf the ends, allowing the stock to widen to permit of a flare.

Heat the center and cut in ⅜" with hot chisel, on the side opposite from the eye. This will allow A-B to be brought together very easily, properly forming the eye. Raise to a welding heat, at the pole of the ax, and weld together. (It is well to have an eye-pin at this time, the proper size and shape to keep the eye in the proper form).

Now take three inches of ⅜" x 1¼" of tool steel, scarf one edge and insert between A and B, and raise to a welding heat, as far back as the eye, using plenty of powdered borax on the tool steel to keep it from burning. In welding, a few blows are necessary on the edges as stock should be allowed to widen to obtain the proper shape when the bit is drawn to the proper dimensions.

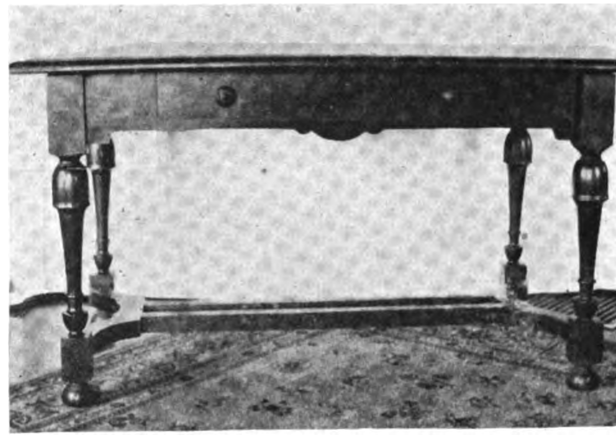
Heat, harden, grind and buff or polish.

The proper temper can now be obtained by applying hot pieces of metal, drawing to the desired hardness. The edge of the steel should not be drawn too thin before hardening, to guard against a possible crack.

A LIBRARY TABLE.

Don A. Sloan, Great Bend, Kans.

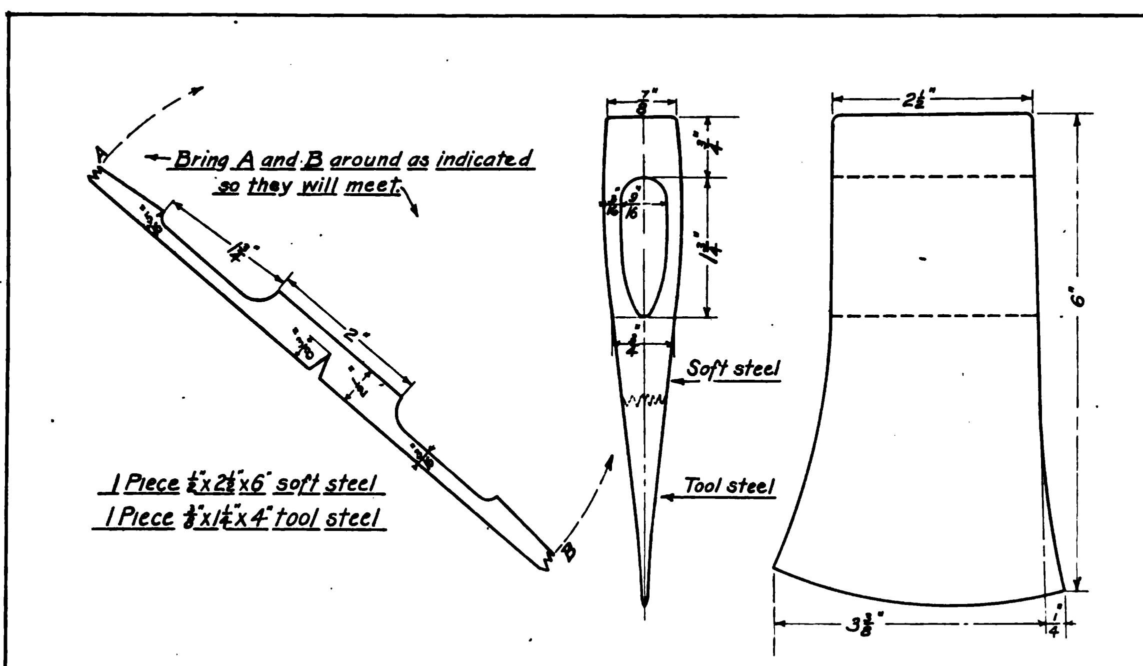
This table was originally developed to afford a problem worthy of the mettle of capable, advanced students in cabinet work and turning. The design was worked out to require a high degree of accuracy, skill and neatness. The lathe work on the legs is simple, but must be done carefully so that the four are exactly alike. The band sawing of the rails, the dovetailing of the drawer and the knock-down construction all involve careful machine and handwork.



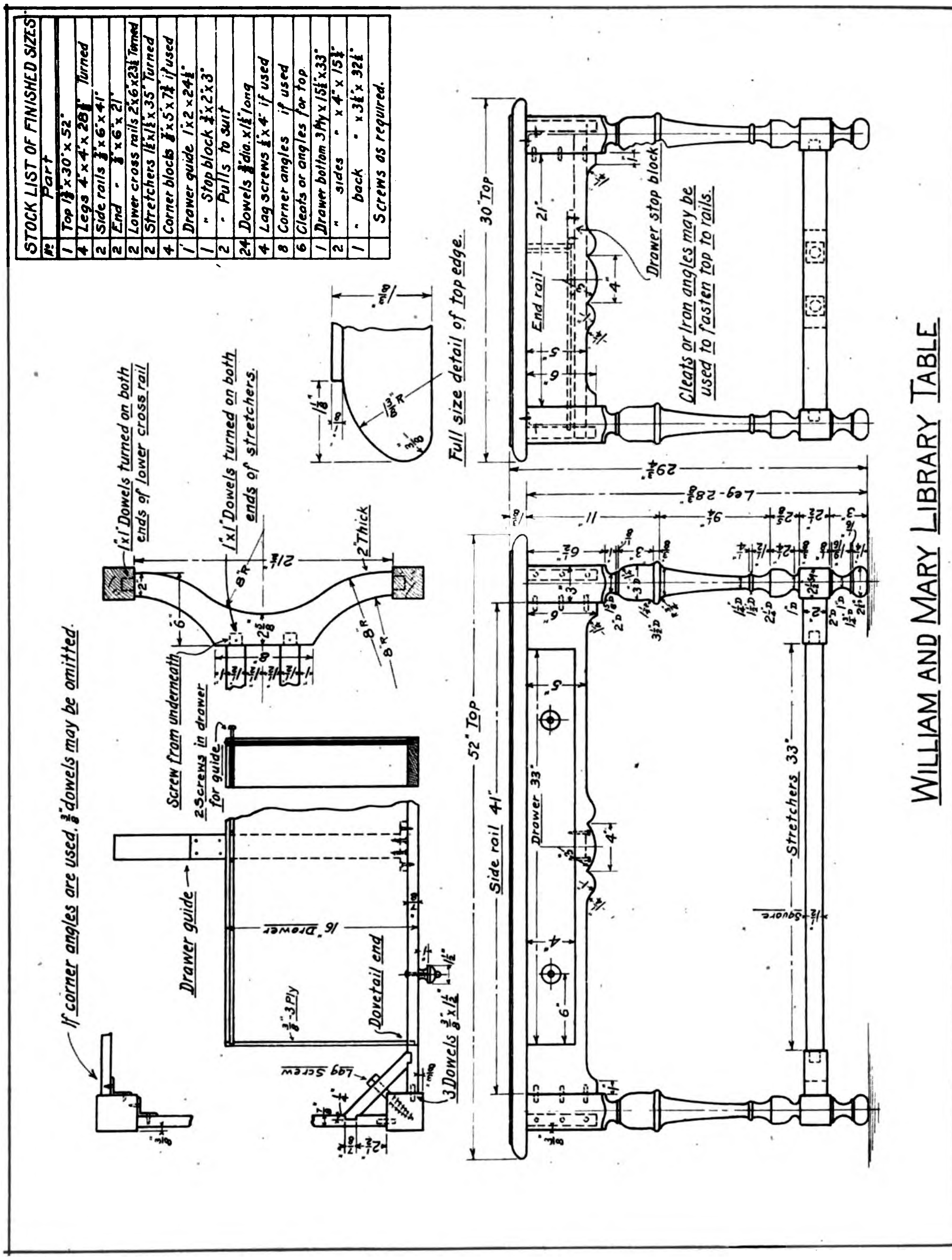
LIBRARY TABLE MADE BY MR. SLOAN'S STUDENTS.

1. To make edge on top, place the straight edge on top at the right distance from the edge and clamp; use bull nose pins.
2. In laying off legs, lay off all four before attempting to turn.
3. Draw the pattern of the rail on cardboard and transfer for exactness.

All assembling was made on the lower rails, by setting a screw from beneath thru the dowel. The construction shown for the drawer will not bind even when opened by one knob.



SMALL AX

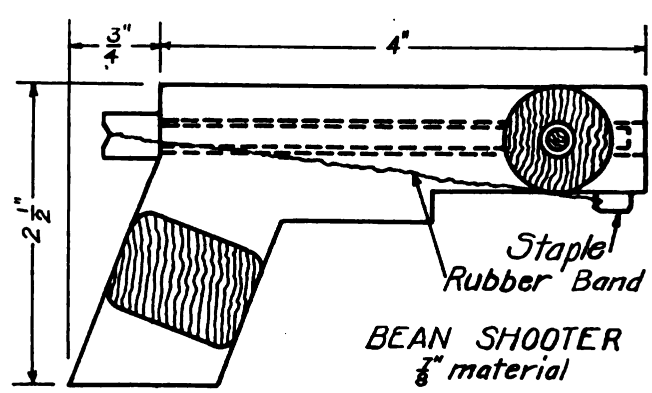


Walnut, finished natural, or quartered oak finished in Pratt and Lambert acid stains. Fumed oak with a two-coat shellac (rub) varnish (rub) wax finish, show up to the best advantage. These are merely suggestive as to the best way to make the particular table. The turning is the real problem.

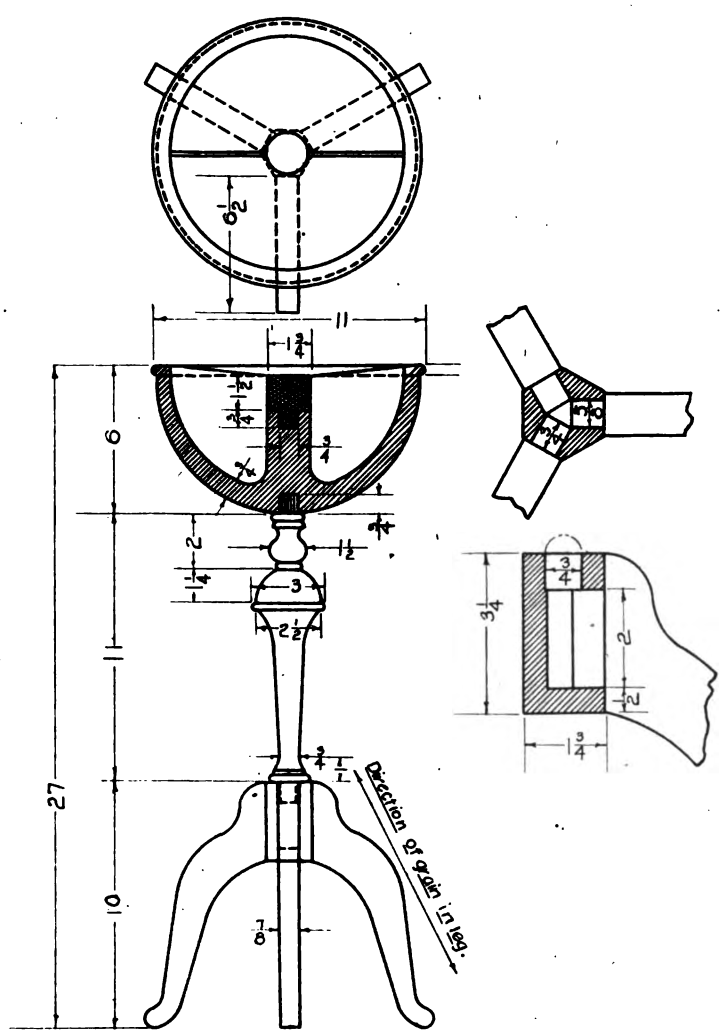
A BEAN SHOOTER.

Stanley Mythaler, Director of Manual Training, Valley City, N. D.

We have found the bean shooter interesting in the grades and desirable because it utilizes scrap material. A tin pattern may be used to aid in laying out. If the plunger is notched just back of the forward end it will stay cocked.



DETAILS OF BEAN SHOOTER.



THE NUT BOWL READY FOR USE.

NUT BOWL ON STANDARD.

F. E. Haines, Muskegon, Mich.

The following is the description and best methods of constructing the nut bowl with standard as shown by the accompanying working drawing.

The bowl is turned from a block of wood preferably walnut or mahogany but any wood is acceptable. It is glued up of lumber $\frac{3}{4}$" in thickness, having the grain in each alternate piece crossing the grain in the previous piece at right angles. The block should be about $11\frac{1}{2}$ by $11\frac{1}{2}$ by 7 inches in the rough. After gluing the stock a circle $11\frac{1}{2}$" in diameter is scribed on one side and then cut out on the band saw. The block is then screwed to a face-plate, care being taken that a large enough face plate is used to insure proper strength for the size of stock being turned. The outside of the bowl is turned to 11" diameter first. The inside is then hollowed out with a $\frac{1}{2}$" round-nose tool leaving the center projecting to receive the metal anvil. It is better to first cut a template from cardboard or $\frac{1}{4}$" lumber to insure getting the proper shape for the inside of the bowl. A $\frac{3}{4}$" hole should be turned in the end of the projecting center to receive the corresponding projection of the metal anvil. The inside is then sandpapered. The bead is turned on the outside of the bowl and the outside of the bowl is turned down to the proper curve as near as the faceplate will allow. The face plate should then be removed and a chuck turned on the faceplate from some soft wood preferably pine. It is turned to the exact size of the inside of the bowl and should fit in about an inch very snug so that the bowl will stay on the chuck during the turning process. The bowl is pushed tightly to the shoulder on the chuck in order to be sure it will revolve perfectly true. If necessary four small brads can be driven thru the rim of the bowl into the chuck to make absolutely sure the bowl will not slip off and break. The outside is now turned to the proper shape and dimensions and sanded, care being taken to work the material slowly to avoid any chance of breaking the bowl. By placing a No. 12 bit in a Jacobs chuck in the tail stock of the lathe, the hole in the bottom of the bowl may be bored to receive the pin on the end of the post. Pull out the brads and force the bowl from the chuck.

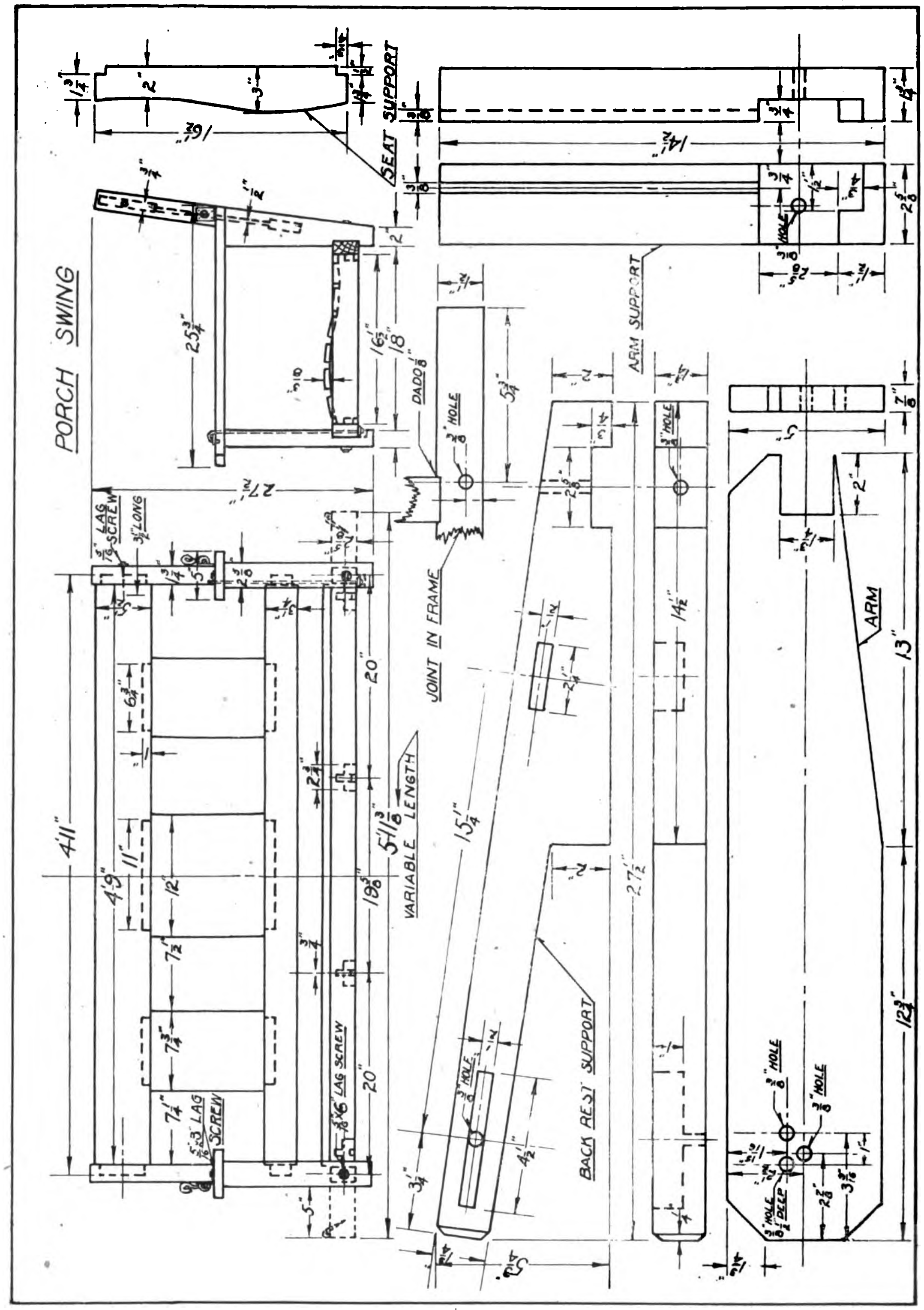
The post is turned to dimensions with a $\frac{3}{4}$" pin on each end. It can be turned William and Mary design or to correspond to any other design of dining room furniture you may wish it to resemble.

The block at the bottom end of the post is hexagonal in shape. Mortises are cut in the three sides as shown, to receive the tenons on the legs.

The legs are cut from $\frac{7}{8}$" stock, the grain running in direction shown by drawing as an element of strength. The mortise and tenon joints should be well made in order to withstand the pounding.

The anvil may be made of iron, copper, or brass and is turned to dimensions given. It should fit snug into the hole bored in bowl.

Two partitions of $\frac{1}{4}$" stock are cut to fit between the anvil on the supporting center and the outside of the bowl. These are braded into place from the inside, and divide the bowl into two compartments, one to be used for nuts and the other for shells, thereby eliminating the necessity of having an extra container for the shells.



The different pieces should be glued together, stained and given two coats of varnish and rubbed down with pumice and rotten stones.

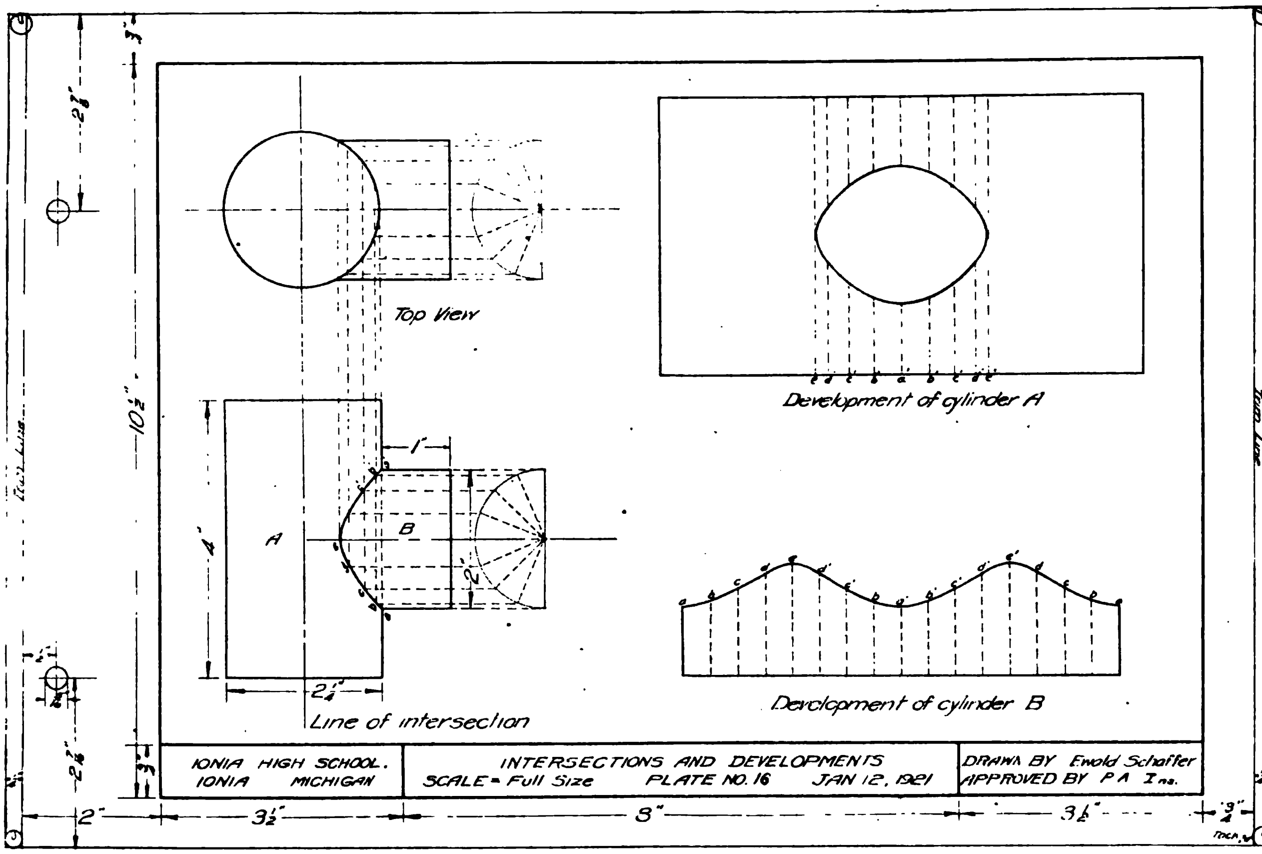
A small metal hammer may be hung on a hook screwed into the bottom of the bowl. This nut bowl is a convenient, practical as well as an ornamental piece of furniture suitable for any home.

PORCH SWING.

Frank W. Walsh, Oshkosh, Wis.

This swing has made many good friends among its builders as well as its users. For its lightweight, simplicity of construction and design it is to be commended. The inclined back, depth and curve of seat, height and width of arm-rest, height of back and four chain suspension make it very comfortable. It is easily taken down to be packed in small space for shipment or storage. All of the rough stock can be ordered from standard stock carried at all lumber yards. This is the result of experience in building about thirty swings of all styles and methods of assembly and suspension.

All of the heavy pieces are cut from a 2" x 6" x 14'-0" or 16'-0" piece of material depending upon the length of the swing bed. Beginning at one end of the piece, lay out the back rest supports first and cut them off. Cut lengths for arm supports, long bed pieces and cross bed pieces, then these pieces should be ripped down the center and planed up. All other pieces are cut from inch or half inch stock and planed smooth. The back rails may be



WORKING DRAWING OF TITLE BLOCK.

rabbetted on the saw then filling blocks be glued in the grooves between the panels. In place of the front supporting rod extending through to the bottom of the bed piece a short, hooked draw bolt may be used, inserting a nut thru a hole bored in the back of the arm support. The back is assembled first, the back bed piece is put in place then the short bed pieces followed by the front bed piece and the arm supports. The arm rests are placed, then the supporting brackets for the seats are placed and the seat slats bradded or screwed on the curved supports.

For a reliable porch ceiling support we have found a piece of one inch seasoned ash four inches wide and long enough to reach three of the ceiling joists, lag-screwed at these three points, to be satisfactory. The ceiling plate hooks are screwed to this piece with the same relative spacing as the points where the chains are attached to the swing. The height of the swing from the porch floor is very important in the matter of comfort.

The design is simple but lends itself readily to additions such as placing panels in the ends between the arm rests and the cross bed pieces or changing the panel effect of the back or changing the over-all length of the swing. However, the comfort alone well repays the builder for his labor.

Caution: If the long bed pieces are to extend thru and supporting chains attached to them, safety chains should be attached to the back rest supports from the rear chains.

THE TITLE BLOCK vs. THE ARRANGEMENT OF VIEWS.

Percival Angove, Instructor Mechanical Drafting, Ionia High School, Ionia, Mich.

Mechanical drafting is a language in itself, and when we attempt to write and read this graphic language thru the aid of mechanical appliances, it should be as all other languages, clear and concise, yet in its simplest form. A drawing which is to convey a meaning should be made in such a way as to be easily understood, eliminating the unnecessary details. The drawing should check itself in such a way as to leave no figuring or even unnecessary scaling.

The alphabet of lines is to be strictly adhered to. Correct method of dimensioning is important. The scales should be sufficiently large to show every detail clearly. Kind of material and number of each part must be indicated. Unnecessary views have no place upon the drawing. Only the necessary and explanatory notes must be given and in a place upon the plate that will not confuse the drawing. But how about the arrangement of views and their place upon the plate or print? Of course, every drawing must have a title. The form and size varies, yet how many teachers are continuing to use the old style, regardless of its disadvantages, of boxing the title in the lower right hand corner. This form and location is used more often in classwork than any other, and how often it necessitates either breaking into the third view or crowding the views towards the left hand side of the plate in such a way as to make the finished drawing look like a conglomeration of lines that will take much time to read, and perhaps convey the wrong meaning. This is often the case, especially in the drawing of a plate where the three views and developed surfaces of the object are required.

What is the matter with making the title block and record strip all in one, to reach across the entire length of the drawing, upon the lower margin line and under the drawing as per illustration?

A well composed drawing upon a plate is a drawing whose views are far enough apart to distinctly separate them from each other, and arranged about the center of the plate with a wide enough space between the margin and the drawing outline on all four sides to make the drawing appear the most dominant feature. In other words, that which is to be understood and read by any workman should stand out in a bold, clear and concise manner.

We often lose sight of the fact as teachers that we should emphasize drafting as a means to an end as far as a finished product made from the drawing is concerned, as well as the teaching of the principles involved thru classroom practice.

It is one thing to be able to make a drawing and another thing to be able to read one clearly. A workman is supposed to read drawings, of course, but very seldom can he make one. Therefore, the drawing should be simplified as much as possible.

The accompanying drawing will explain itself. Perhaps a more complicated drawing which would involve a three view working drawing plus an auxiliary view and the developed surfaces, would have made the title strip more necessary. The drawing illustrated is one actually made in the author's classes and shows the style and size adopted. The original size of the plate is 12"x18¼", and after allowing for a margin the size of which is indicated upon the drawing, it will be readily seen that in order to have the working space 10½"x15" that the only waste is the one-fourth inch strip on each end, which is to be removed after the drawing is completed. This strip insures the only space for scratching, trying out pens and for the placing of the tacks, etc., there being no waste on the upper or lower edge of the plate. The two-inch margin is allowed for the binding holes, as a portfolio of all the plates is made at the end of the year's work. Of course, the size and shape of the plate may be varied but the record strip and title block could still be together. You will find that the size of the plate, as indicated, is a very convenient size for most drawings and will allow space for the nonconfusing of views, "provided the strip is used." The illustration does not necessitate many notes, but in case of a working drawing where the third angle projection is used, the drawing could be composed about the center of the plate and the space above the third or side view reserved for notes.

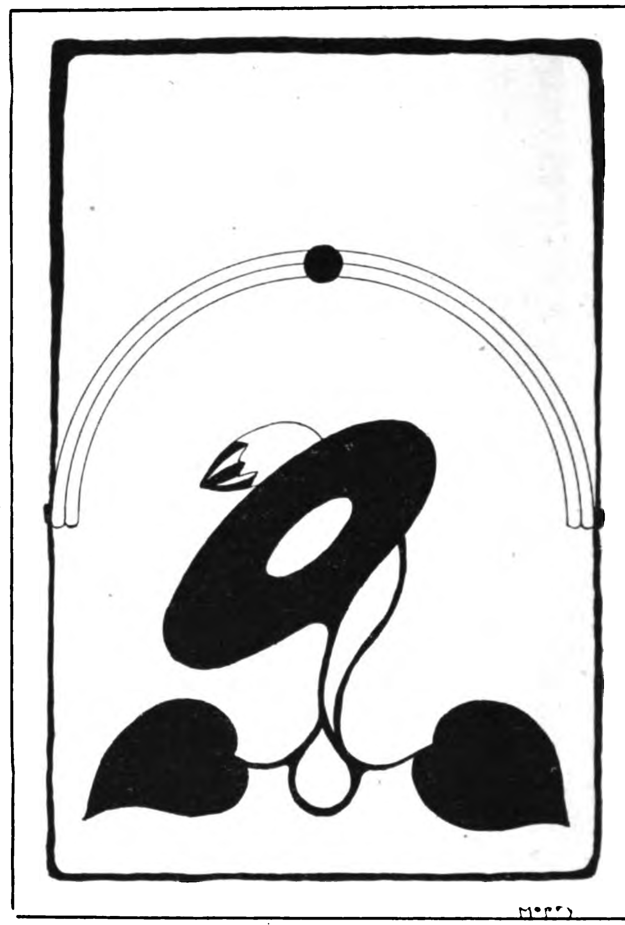
BAG MOUNTING.

Bertha Morey, Ottumwa, Iowa.

Satisfactory bag tops may be made by cutting a pair of embroidery hoops in half; round off the corners and smooth with sandpaper, drill a hole in each end in the same position.

The best, most durable and easiest covering for the half hoops is velvet ribbon wide enough to fold around the hoop. The hoop may be padded or shaved slightly to fit the ribbon. Turn in the ends of the ribbon and overcast the edges of the ribbon. Before sewing the bag to the top the two parts of the top must be fastened together at the ends. A small button to match the top covering should be strung on six strands of buttonhole twist, then all twelve of these strands threaded thru both the drilled holes of the top and separate into the original six strands. Sew one bunch of the threads thru a small button and tie with the remaining threads into a hard knot, however, leaving it so that the hinge will work. A round button and loop forms the top fastening. Velvet ribbon may be sewed to the frame for the handle.

For most bags round hoops make the most suitable tops. The oval hoops are even more interesting and may be cut either thru the long or the short way.



DESIGN FOR BAG

ART TEACHING IN NEW YORK CITY SCHOOLS.

The art department of the New York City schools has just issued its annual report on the work which has been accomplished in the city high schools. The report which has been prepared by Mr. James P. Haney, Director of Art, contains in addition to other material, a review of the last two years' work.

A study of the report shows how important and practical the art teaching in the high schools has become, and points to the many illustrations which emphasize the professional standards demanded. These appear in the commercial work in posters and advertisements which have depicted the beautiful in dress design and in the co-operative service of the schools with the toy associations and with other business organizations.

New York City claims the largest high school art department in the country and its 150 studios number more than the combined high school studios of Chicago, Boston and Philadelphia and three or four smaller cities. Nearly 50,000 children study art work in the first two years of high school, and several thousand more have been placed in special classes for the talented in the higher grades.

It is the purpose of the art department to provide for the training of all the children in taste, and to offer the gifted training in skill that will form the basis of technical work. It is desired, especially, to raise the standard of taste rather than to produce artists. In the opinion of Dr. Haney, a higher standard of taste means an advance along many lines. In this direction, the art teaching has been planned to have a practical relation to the business interests of the community. He shows in the report how many different agencies have been brought into cooperative relations with the several high schools. These include art museums, art societies, trade and social organizations. A supplementary organization called the School Art League is used for the formation and development of many museum courses and special art classes.

The extent of the popularity of these special courses in art for the talented may be shown by the rapid growth of the higher elective courses. These courses which were developed during the war in response to a demand for industrial training, caused a large demand for skilled workers. The value of this work has seemed to justify its existence thru the fact that the trade has constantly drawn upon the graduates of the high schools for its trained designers in industrial arts. Special courses are now offered in a dozen high schools and scores of students are trained in post-graduate work thru a scholarship plan. In the opinion of Dr. Haney, it outlines a saving scheme of real importance since it offers to gifted boys and girls an opportunity to cultivate that ability in art which they crave, while at the same time pursuing their high school course. The scholarship plan is recognized as having special value in directing the talented pupils into special channels where their talent will be of the greatest value to the industries, to the country and to themselves.

THE MINNEAPOLIS CONVENTION.

If there were any skeptics concerning the possibility of holding a great vocational convention in Minneapolis, they were thoroly convinced of their error before the meeting of the Vocational Education Association of the Middle West had really got far under way. This association is unique in at least two respects as regards vocational organizations. It makes the most complete recognition of agriculture as a vocational subject and it places commercial education in its rightful position among the vocational lines of work. A third aspect in which this organization has shown its keen appreciation of the modern trend of things is the emphasis which it has placed upon women's work.

The Twin Cities more than kept their promises. They always threw in something for good measure. They even arranged perfectly mild weather for the whole convention. The hotel facilities, while crowded to capacity by the large attendance, were nevertheless comfortable and well adapted to the needs of the convention. The commercial exhibits were adequately housed in unusually convenient and attractive quarters and the various meetings, luncheons, etc. were held for the most part in nearby rooms of the hotel. Some of the meetings, however, were arranged at school and church buildings within the immediate vicinity of the hotel.

The program, as had been freely predicted, proved to be the probable equal of any similar program ever presented in this country. It was participated in by many of the greatest experts in the various lines of industrial, commercial, agricultural, home economics, teacher-training, vocational guidance, and educational psychology to be found in this country and Canada. Selecting at random, the following names and topics will suffice to indicate the character of the program thruout: "What Girls and Women Should Know About Laws Affecting Their Employment," Agnes Nestor, Women's Trade Union League of America; "The Canadian Plan for Industrial and Technical Education," L. W. Gill, director of Technical education, Canada. "Directed Versus Indirect Acquisition of Skill in Typewriting," Harry D. Kitson, professor of psychology, Indiana University; "The Use of Mental Tests in Vocational Guidance," William M. Proctor, Leland Stanford University; "Fundamentals Underlying All Teacher Training," M. E. Haggerty, dean of the college of education, University of Minnesota; "What the Smith-Hughes Law Has Made Possible," Uel W. Lamkin, director for the Federal board of vocational education; "The Method of Social Science Teaching," Ruth Mary Weeks, Kansas City.

The high point of interest and enthusiasm during the whole meeting was probably reached at the annual banquet on Friday evening when three stirring and timely addresses were delivered by Dr. C. A. Prosser of Dunwoody Institute; Hon. Duncan Marshall, minister of agriculture, Province of Alberta, Canada, and Miss Ruth Mary Weeks of Kansas City. Three such addresses would set the pace for any convention of any group of educators.

Naturally, a vocational convention in Minneapolis would be incomplete without a visit to Dunwoody Institute, hence the visit was made by most of the members and visitors of the association. Besides this, there were visits to some of the various great milling and other industrial plants for which Minneapolis and St. Paul are widely noted. These trips added a most enjoyable feature to a program crowded with most enjoyable features.

Perhaps the credit for so successful a meeting should at least be shared with the numerous people who were wise enough and fortunate enough to attend the convention. However, the bulk of the credit belongs to the energetic, timely, and persistent efforts of the president, Prof. Edwin A. Lee of Indiana and to the same kinds and quantities of efforts by Mr. John M. Greer, assistant superintendent of schools, Minneapolis. They were aided at every turn, of course, by faithful workers whom they had selected to help carry the big undertaking to a successful conclusion. Among these were the same faithful men and women in and about Chicago who have always stood by the organization. Of course St. Paul, in the well known fashion of its splendid and capable leaders in educational affairs, joined hands heartily with the "suburb across the river," as one of them facetiously remarked, and helped to make the meeting a great success.

PROF. J. A. JAMES,
Madison, Wis.
President, Vocational Education Association of the Middle West.

This meeting probably drew the largest membership in the entire history of the organization. The "Great Northwest" showed its appreciation of such an opportunity at its very door and sent large numbers of its teachers to profit by it. By actual report, there was a surprising number of members whose expenses were paid by schools, cities, clubs, chambers of commerce, etc.

Besides the convention proper, there were two conferences on the preceding Wednesday evening. One was a conference on various phases of industrial education with Dr. Wm. T. Bawden in charge. The other was a conference on the preparation of commercial teachers for secondary schools. Unusually strong programs were presented in both of these conferences and the attendance was large. These meetings rather gathered the membership of the Association early and prepared the way for the opening of the main convention on time and with full attendance and a ready enthusiasm.

The officers for the next year were elected as follows: President, J. A. James, professor of agricultural education, University of Wisconsin, Madison; Vice-Presidents, Miss Cleo Murtland, University of Michigan, Ann Arbor, Mr. F. C. W. Parker, Chicago, and Mr. H. M. Appleman, South Bend, Ind.; Treasurer, Mr. James McKinney, Educational Director, American Correspondence School, Chicago.

The board of directors will be composed of Mr. Wm. Bachrach of Illinois; Ruth M. Weeks of Missouri; G. I. Barnes of Kentucky; J. N. Greer, Minnesota; Edwin A. Lee, of Indiana; Lewis Gustafson of Missouri; Chas. M. Yoder of Wisconsin; Jas. M. Early of Iowa; Alice M. Loomis of Nebraska and Jos. D. Bicknell of Michigan.

An Exhibition of School Projects. The Boys' Vocational School, at Albany, N. Y., had an exhibition of school projects in a large show window of the Capital District's leading hardware concern, during the latter part of March. The projects were all the work of the boys and represented the by-products in the learning of a trade.

Evening School Closing. The closing exercises and exhibit of the Vocational School at Albany, N. Y., were held on March 18th, at the Albany High School. The exhibit has always been a splendid success, demonstrating in a very practical way, the ability of both teacher and pupil.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Furniture Polish.

166. Q:—I have read in the Industrial Arts Magazine from time to time splendid explanations and instructions for a rubbed varnish finish. In these articles, however, the final polishing was not discussed. What is the best polish for such a finish? Could wax be used with good results over rubbed varnish?

Could you inform me of any manufacturers who make exhibits that may be secured for use in a manual training or drafting room?—H. H. R.

A:—The final polish on a rubbed varnish finish should not be a wax. A wax sometimes is injurious to varnish and always leaves a sticky film which is hard to remove and as time goes on leaves a heavy bloom.

Following are variations of a commonly used formula for a final polish. It can be made up in small quantities.

Raw linseed oil....................1 quart
Light golden oil...................1 quart
Water ....1 1/3 quarts
Mix these well and add acetic acid..1/2 pint
Wood alcohol ....1/4 pint
Butter of antimony.................2 ounces

A few grains of Bismark aniline will give it a nice color. The polish should always be shaken before using. This formula is taken from "Problems of the Finishing Room" by Walter K. Schmidt.

Another formula: For cabinet work, mix in a glass bottle thirty-two ounces by weight of raw linseed oil, eight ounces strong alcohol (spirits of wine), eight ounces of strong vinegar (or acetic acid), two ounces butter of antimony and eight ounces oil of turpentine. Shake the bottle well before using the polish and apply with a woolen rubber, using friction.

The best prepared polish which has come to the writer's attention is Ivory Cream Furniture Polish, made by the Waring-Bowerman Wood Finish Products Co., Syracuse, N. Y.

Plans for Canoes.

168. Q:—Can you furnish plans for phonographs and canoes?—R. A. D.

A:—Illustrations and plans for making phonographs have appeared in the Industrial Arts Magazine for November, 1919, page 466. You will also find illustrations and drawings in the Furniture Manufacturer and Artisan for September and October, 1918.

The making of a canoe was fully described with drawings in the Industrial Arts Magazine for February, 1918, page 50. The following books will be helpful to you: Manual Training Toys for the Workshop, H. W. Moore, $1, Manual Arts Press, Peoria, Ill.; Practical Boat Building, A. Neison, $1, F. J. Drake, Chicago, Ill.; Canoe and Boat Building, Stephens, $2, Forest and Stream, New York City.

Books on Saddlery.

171. Q:—Can you direct me to a book on saddlery?—E. P. VL.

A:—There is very little literature on the market concerning saddlery. The following books, however, are available: Harness Maker's Complete Guide, $2.50, National Harness Review, Chicago, Ill.; Harness Shop Estimate Book, $2.50, National Harness Review, Chicago, Ill.; Illustrated Guide for Harness Makers, Cutters and Apprentices, $1.00, The Harness World, Cincinnati, O.; Harness Making, by Paul Hasluck, 50 cents, Cassell & Co., New York City; Saddlery, by Paul Hasluck, 50 cents, Cassell & Co., New York City; Art of Making Harness Successfully, J. C. Jordan, $2.90, Tuskegee Normal and Industrial Institute, Tuskegee, Ala.

Wood Finishing.

178. Q: In manual training work I find that the proper finishing of wood is quite an art. There are several different things I would like to know more about and am submitting these questions to you.—W. E. T.

Q: Is acid stain or oil penetrating stain the best for walnut or mahogany finish on gumwood, birch, poplar and walnut wood?

A: By all means use the water or so-called acid stain for these woods. It is not practical nor desirable to use oil or spirit stains, especially on walnut, gumwood and birch, which are very active chemically and which cause the stain to fade out rapidly in the presence of direct sunlight. It is impossible to set an oil or spirit stain and thereby prevent its fading. The greatest disadvantage of all lies in the fact that an expert workman alone can produce a finish with oil stains, due to the muddiness of the finish and the quickness with which the color is lifted by the shellac or varnish coats, thereby rendering it streaky and unsatisfactory.

Q: Do any of the above woods require a filler and if so should it be used before shellac or after?

A: Any open pored wood as walnut, mahogany, birch should be filled, the latter, however, being a very small pored wood should be treated with a very thin filler. Some finishers maintain that it is unnecessary to fill birch, but where tested under practical conditions, a much finer finish has been produced with less varnish on filled birch than on wood not so treated. Following the application of the stain, it should be allowed to dry at least 24 hours in a warm room and without further treatment be given a sizing coat of shellac from stock goods, thinned so as to have about 2 lbs. of shellac gum per gallon. Most high grade shellac on the market is cut 4 lbs. to the gallon and should be purchased on that basis. As soon as the shellac coat is dried hard, it should be sanded very smoothly, preferably with a split 0000 sandpaper, then dusted off carefully and filled with a good silex filler which should be allowed to dry at least 48 hours before varnishing. This procedure is necessary in order to produce a perfectly clear, transparent finish, due to the following reasons. If the filler is applied to the stained wood without any sandpapering, following the stain coat, the wood will absorb oil from the filler as well as some fine pigment and the result will be a blotchy appearance with cloudy portions near any improperly sanded work. By filling after the shellac coat. the color is forced thru the whiskers which may be raised by the water stain, the dried shellac hardens the whiskers so they can be cut off with the paper to leave a hard, glass smooth surface, free from the grayish effect which occurs when stained work is sandpapered before shellacking.

Q: Do you consider one coat of shellac and two coats of cabinet varnish sufficient to give a first class finish?

A: Any experienced finisher with high grade materials can produce a very fine finish in two coats of heavy bodied varnish over shellac. For the grade shops, however, and trade schools, it hardly seems possible for beginners to get the proper surface in less than three or four coats and by a proper surface, I mean one which is as true and free from imperfections as high grade mirror plate.

Q: Is steel wool better than sandpaper for smoothing shellac and varnish? If not, what is the best number of sandpaper to use for shellac and for varnish?

A: A split 0000 paper is the best material for cutting shellac or varnish. Steel wool is all right on cheap work, but it is a very dirty material to clean up and is almost impossible to remove from the edges and moulding of panels and similar portions. Finishing paper in any 0 up to 10 may be purchased from sandpaper companies and should be bought as 0000 double surfaced finishing paper ready for splitting. The sheet should be torn into eight portions which are economically the right size for doing this kind of work. Each portion should be split in half so as to give two very thin sheets of sandpaper where but one formerly existed. Some finishers even moisten the paper back of the split paper in order to make it still more flexible, finding that this enables the sand to get down to the surface much faster and produces a more even cutting. The difference between sandpaper and steel wool lies in the fact that the paper tends to level up all inequalities whereas steel wool simply slides over the hills and valleys without rendering them level.

Q: Can gumwood be used successfully for cabinet work without danger of it warping or twisting?

A: The Kraetzer Cured Lumber Co., of Greenwood, Miss., can supply absolutely guaranteed stock. The ordinary gum stock on the market is not to be trusted, since it is well known to the trade that gum is the trickiest of all woods to cure.—Ralph G. Waring.

The INDUSTRIAL-ARTS MAGAZINE

MAY - 1921

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INDUSTRIAL-ARTS MAGAZINE

Volume X MAY, 1921 Number 5

Trade Tests, Their Construction, Use and Possibilities in Industry

G. G. Weaver, Instructor Vocational Teacher Training, University of Pittsburgh, formerly Employment Mgr. Delco-Light Co., Dayton, O.

AMONG the many results of the World Conflict we have the stimulus it has been to various activities in commercial life and especially to those forms of business pertaining to human relations. The methods pursued in the personnel departments of many up-to-date industrial concerns is an indication of the aftermath of the personnel division of the American Army. An integral part of this personnel work is trade tests.

To be sure those persons responsible for the hiring and placement of workers in industry have had some means of testing applicants, but it is safe to assert that in the formulation of their questions they were not guided by any definite fundamental principles. The questions which they gave were of such a nature as to permit vague and rambling replies, instead of clear and concise answers. Because of this one fault, with a number of others, the old types of questions have proven entirely inadequate for the selection of workers in a modern centralized employment office.

The introduction of trade tests into industry has met with a considerable amount of favor, probably due to the fact that the employment profession is in its infancy and the majority of employment managers are receptive to new ideas and methods.

Definition.

A trade test is either an oral or performance method of determining a person's proficiency in some particular kind of trade work.

Whether the test is of the oral or performance type, it should satisfy certain requirements.

First: It should indicate with considerable accuracy the grade of skill possessed by the person being tested.

Second: It must be concise and simple enough that any person of ordinary intelligence may make use of it to obtain satisfactory results after very little training.

Third: It must be constructed according to the practice of the trade in the particular community in which it is to be used.

Fourth: That it will test the ability possessed by the applicant at the time the test is given.

The trade test aims to test the man's trade skill or trade proficiency in the shortest possible time. We understand that trade proficiency consists of a mass of common trade knowledge in addition to the ability to perform the operations of the trade. It is the purpose of the trade test therefore, to ascertain the degree of this common knowledge possessed by the applicant. If the test is properly constructed it will surely detect whether or not an applicant is a tradesman, as well as his degree of trade skill.

Many people have been laboring under false impressions regarding trade tests, in that, they understand the test to be used for determining a person's inclination or aptitude to a certain trade. That is a decidedly erroneous belief, as the trade test claims in no way to test potentialities. It is not psychological in nature and therefore claims no power to make deductions regarding the person's aptitude or potential skill.

Construction of an Oral Trade Test.

In order to formulate a practical trade test it is absolutely necessary that you get in direct contact with the trade. Contrary to the thoughts of many, this job is decidedly not a desk or an academic job, but one involving the co-operation of tradesmen, foremen, educational departments and statisticians.

Altho various means have been employed in the building of trade tests, the following procedure has been used quite successfully and is to be recommended.

1. Ascertain by sufficient inquiry whether the work for which you desire to build a trade test exists as a distinct trade. Also determine whether there exists various grades of skill within the trade.

2. If the investigation indicates the possible testing of workers in that particular trade, information pertaining to the trade should then be collected. The sources of this information should be workers in the trade, foremen, trade journals, books on practical trade subjects, etc.

3. After the trade has been investigated and information collected and properly arranged, we should formulate our questions for a preliminary try-out. When planning the questions it is advisable to group them according to some definite order. A suggested order is as follows:

(a) Processes and operations.
(b) Tools and appliances.
(c) Machine parts and their respective functions.

The analysis of the trade into these general groups is entirely dependent on the content of the particular trade under consideration. In the majority of cases it lends considerable efficiency to the test if the questions are grouped according to some definite scheme.

4. In order that our questions may be effective the following points must be kept constantly in mind.

(a) The question must be phrased in absolute trade language which necessitates the elimination of theoretical and technical terminology.

(b) A question must be self-contended in order that no explanation be necessary by the interviewer.

(c) A question should be brief and unmistakably clear.

(d) A question should call for a short and definite answer.

(e) No catch questions should be used as we should deal only with good trade practice.

(f) It must not be a question that permits of an answer "yes" or "no." Any question with this possibility is of no value.

(g) It must not be a question which permits the one questioned to guess the correct answer. The question must be so phrased as not to indicate the answer.

(h) The questions should vary in their degree of difficulty from the simple to the most difficult in order to cover the range of skill from novice to expert.

(i) After the questions have been written and grouped according to the suggested plan each question should be followed by a tentative answer.

5. After step No. 4 has been completed the next step in the process is to give the questions a preliminary tryout. For the completion of this step we select men from the trade whose ability we already know and ask them the questions. The group selected should consist of about four men representing each of the four grades of skill existing in the trade: that is expert, journeyman, apprentice and novice. This preliminary tryout has several objectives:

(a) To eliminate any questions which are not good trade practice questions.

(b) To discover any questions which are not clearly understood and need re-construction.

(c) To establish standard answers.

(d) To determine whether the test covers the entire trade from the work of a novice to that of an expert.

(e) To ascertain the practicability of giving a trade test in this particular trade.

There is a considerable amount of technique involved in giving a trade test. This material will be presented, however not at this time.

6. After the questions have been re-written and arranged according to the suggestions above, the next step in the process is to test the questions (this is a very vital procedure as it would be disastrous to use the questions for selecting workers before the questions were tested). For the execution of this step we select a group of four to eight workers, (whose ability we already know) representing the different grades of skill in the trade (novice, apprentice, journeyman, expert). This tryout will prove especially valuable if special attention is given to the answers received in response to the questions, as well as, any comments or criticisms that may be volunteered.

The men used for this step are known tradesmen of varied grades of skill. Before giving them the test we should make note of their supposed status in the trade. This point is very valuable as this data is used in the calibration of the final test.

7. This tryout will form a basis for the final revision and will indicate several points:

(a) The question which is vague or impractical.

(b) The question which permits of a varied interpretation, resulting in a wide range of answers.

(c) Points out the questions which clearly test the various grades of skill.

(d) Whether the test is applicable to that particular trade.

8. After all deductions have been made from the try-out the succeeding step is to standardize the test. This work necessarily involves a fine degree of judgment and skill. It consists of giving the test to a fairly good sized group of persons engaged in the trade whose ability is known. By the means of this final tryout various things are revealed which should prove valuable to the establishment of standards for the rating of prospective employees.

Statistical Treatment of Results.

The common method of determining the relative value of each question is to plot the results on section paper. The number of questions used should not exceed eight to fifteen as it is to be remembered that the trade test to be practical in industry, must consume the minimum amount of time.

A typical trade test is one in which all questions can be answered by an expert, the majority answered by a journeyman, a few correctly answered by an apprentice and practically none answered by a novice. This particular situation may never exist, however there are times when the results closely approximate the above situations.

As stated above, the plotting of the results will indicate the typical expert, journeyman, apprentice and novice respectively. It is necessary to evaluate the questions and select eight to fifteen questions from the entire lot which will cover the range of skill which we hope to test.

Remembering that the trade status of the men used in establishing the standards was known, it is clearly evident that any question which is answered by more novices than apprentices or more journeymen than experts is decidedly a poor trade question and therefore should be placed in the discard.

9. After we have decided on the questions which should be included in the final tests as a consequence of our plotting the results, the test must be calibrated. This step consists in the establishment of scores which

indicate an expert, journeyman, apprentice and novice. In order to set up these standards or scores it is necessary to refer to the scores made on these selected questions by the men whose ability we knew and who were used to evaluate the test.

It is possible that a good apprentice will score the same or close to that of a low journeyman. Some journeyman may score the same as a low expert. Such a condition is not a serious one as certain over-lapping is sure to occur. After the completion of the work to this point the test is ready for use in the employment office for the purpose of testing prospective employees.

The following is a trade test formulated and standardized by the writer and used in testing applicants for the job of punch press operator in a large industrial plant of the Middle West. This test passed thru the progressive steps as indicated in the forepart of this article.

Sample Test for Punch Press Operator.

1. Q. What is it that prevents the bar of sheet metal from lifting with the punch?
   A. Stripper plate. Score 4.
2. Q. Name two things sometimes provided on a die to assist in keeping the stock located while punching.
   A. Set-edge.
   Finger stop.
   Gage.
   Guide pins.
   Stripper plate. Any two, Score 4.
3. Q. What two things usually hold the die?
   A. Bolts.
   Clamps.
   Set screws.
   Stops. Any two, Score 4.
4. Q. What type of die is used for cutting off pieces from a bar?
   A. (1) Shearing. Score 4.
   (2) Cut-off. Score 4.
5. Q. By what process is the "wire edge" removed from the blanks after leaving the press?
   A. Rattling (tumbling). Score 4.
6. Q. Name the instrument used on a punch press to indicate the number of punchings.
   A. Counter. Score 4.
7. Q. What effect has the punching operation on the copper?
   A. Harden (warp) (stiffen). Score 4.
8. Q. With what is the stock usually fed into the punch press?
   A. (1) Hand. Score 4.
   (2) Roll feed. Score 4.
   (3) Automatic. Score 4.
9. Q. From which side does the operator usually feed his stock?
   A. Right. Score 4.
10. Q. What advantage has the inclined press?
    A. Lets stock get away quicker. Score 4.
11. Q. What part of the punch press causes the ram to move up and down?
    A. (1) Driving shaft. Score 4.
    (2) Crank shaft. Score 4.
    (3) Eccentric shaft. Score 4.
12. Q. What will the punch press do if the clutch sticks?
    A. (1) Repeat. Score 4.
    (2) Double trip. Score 4.
13. Q. How is the size of the punch press specified?
    A. (1) Number. Score 4.
    (2) Stroke. Score 4.
14. Q. What will happen to the punch if oil is not used on the stock?
    A. Gall. Score 4.

Rating the Candidate.

Score	Rating
8 and below	N
10, 12 and 14	A
16 and 18	A plus
20 to 32 inclusive	J
34 to 36	J plus
38 to 50 inclusive	E
52 and above	E plus

Using Trade Tests.

Altho you may have a good test as a result of closely following all rules pertaining to the formulation and standardization of trade tests, its success depends to a major degree on the examiner and the manner in which he gives the test.

Some of the pre-requisites of a good examiner are a pleasing personality, businesslike methods and tact. It must be assumed that the applicant is more or less disturbed when applying for a position, and especially if he realizes he is to take a test. It is therefore the examiner's job to set the applicant at ease by his manner of greeting the applicant and introducing him to the test. The examiner, in his conversation with the applicant, should at no time use the word TEST if possible to eliminate it.

It is advisable to briefly state to the applicant that you propose to ask him a few questions, for example: "Mr. Smith, I have a few questions I wish to ask you about your trade, before I am able to tell what kind of a job we can offer you. I might tell you that no catch questions are included, but only such questions as pertain to actual work in your trade. Take your time and think carefully before answering. I prefer that you give short answers."

The examiner should exercise a familiar and pleasant attitude to the applicant thruout the interview and carefully observe the following points.

1. To ask the questions exactly as they are indicated on the test.
2. Speak slowly and distinctly.
3. Refrain from the use of gestures of any kind which might assist the applicant.
4. Do not show your approval or disapproval of an answer. Failure to observe this point may result in assistance to the applicant.
5. Refrain from prompting the applicant in any way. If the applicant asks a question about the original question, merely state "I am sorry, Mr. Smith, I can't answer your question, but I will repeat the original question."

One or more answers are given to each question for the convenience of the examiner. As a rule there is a key word in the answer to each question and the trained examiner will detect that key word, altho it may be supplemented with an extended explanation. Ofttimes the applicant will give the answer, but will want to tell you almost his entire trade experience. In such cases the examiner must exercise special tact in limiting the discourse without offense to the applicant.

Each question is given a value. In this case, four points. The applicant's total score indicates his trade status. The scores at the end of the sample test indicate the results of the original calibration, and by refer-

ence to these scores it is possible to establish the applicant's trade status.

Trade Tests in Industry.

The trade test is but a refinement and a standardization of the crude methods formerly used in industrial and commercial establishments for detecting the applicant's fitness for employment in that particular organization.

Such tests may be and are utilized in part or in all of the following situations:

1. Hiring new workers.
2. Promotion of employees to jobs of greater skill.
3. Selection of men for special training.
4. Transferring men due to changing labor conditions, change in production schedule, ambition of the employees, or unfit adjustment of men to their present jobs.
5. Emergency substitutions.

There has been a considerable amount of skepticism surrounding the introduction of trade tests in industry. To be sure, it is a perfectly natural reaction which accompanies anything that is more or less revolutionary in character. After realizing the various steps thru which the material must pass before being used as a test, it seems logical to expect the most practical minded folks to accept trade tests as a big step forward. That trade tests have decided limitations is a certainty. However, the obtaining of more definite, more objective and more permanent standards of trade skill for the placement of all employees stands out as a project of merit which will repay to employers and employees a considerable amount in terms of time and effort. The practical limits to the application of trade tests are yet undetermined and will depend in part at least on the attitude of the man having jurisdiction over this piece of research work. Many of the trade tests which were used with a high degree of success in the army are probably not immediately applicable to industry. That the general method employed in making the army tests can be applied in industry with little change, seems quite certain.

The comparative newness and the lack of knowledge of trade tests necessitates quite a bit of educational work among shop executives where it is hoped to introduce these methods. The writer arranged for numerous personal interviews for each of the shop executives and supplemented these interviews by literature on the subject which was finally followed by using one of the army tests on each of the executives. This method of procedure in introducing the subject to the executives of the organization, established the foundation for co-operation in the development of the tests, and at the same time gave the executives an insight and a better knowledge of this phase of the personnel work. The results at times appealed to them as almost miraculous and tended to sell the proposition beyond its true worth.

Altho this procedure consumes a considerable amount of time and apparent delay in putting across the program, it is decidedly the advisable plan to follow. It is worthy of note that practically no difficulty was experienced in securing the hearty co-operation so necessary to the conducting of such a project, and much valuable information and data was volunteered by the executives.

Before attempting to recommend the use of trade tests it is necessary to make a thoro analysis of the various jobs that exist thruout an organization, and from a study of this data, it is possible to determine the following essential factors:

1. The practicability of a test in the particular trade or occupation.
2. The elements which require or permit of testing, that is, whether men can be graded in the occupation or trade according to degrees of skill. In some trades it will be found that the trade requires simply the performance of a single set of operations and there are no gradations among the members of the trade.
3. The kinds of tests that may be used. Some trades, such as truck driver and typist are mainly features of skill and for them only performance tests are practical. Other trades, however, such as maintenance occupations, inspectors, testors, etc., are chiefly matters of knowledge, in which case oral or picture tests are best adapted to these occupations.

The practicability of trade tests in any industry may be determined by several definite factors:

1. The amount of turn-over or the number of men hired for that occupation during a definite period.
2. The elements of the occupation which permit of test.
3. Whether the practices of the occupation are common thruout the community or the country.
4. The methods of training and promotion in that particular industry.

Summary.

In view of the foregoing discussion in regard to trade tests they may be considered from the standpoint of industry as follows:

1. As a means of preliminary tentative selection of men by the employment interviewers for a specific occupation in the factory provided the applicant claims to be a skilled tradesman.
2. As a means of testing folks after the completion of a training course provided by the industry in specialized processes and divisions of certain trades.
3. They may be considered impractical for jobs where loyalty, ability to learn, initiative, general character, etc., are essential factors.
4. They have greater possibilities in the more highly skilled trades than where the work is highly specialized and company operatives predominate.

In brief, they are but a ***big step in the right direction.***

PAPER-FIBRE WEAVING

Walter K. Schmidt, Grand Rapids, Mich.

THE accompanying illustrations show a number of articles, such as baskets, stands, etc., the construction of which presents endless opportunities for school work.

They are constructed of paper-fibre, a material which doubtless is more or less familiar to all instructors of manual training. It is furnished in the round style, which is more common, and also in the flat form which has not been used so extensively. The round style is generally employed commercially for manufacturing chairs, settees, tables, etc. The flat cord is adaptable for shirt waist boxes, waste baskets, screens, flat lamp shades, etc.

Any of the smaller articles can be easily made by any of the grade students, and in the higher grades the pupils will find much benefit from the construction of the larger pieces. The pieces are, in reality, simple to make, and when finished are very acceptable around any home.

In order to give the reader a general idea of the procedure to be followed, instructions follow for making a small basket, the size and form of which, can, of course, be varied to suit.

Figure 1 shows how the ribs or stakes of the basket are placed in position. The stakes consist of a tough, specially prepared paper, twisted by machinery around a wire center. You will then have ten long ones and one short one. This number can be varied, of course, but always be sure to have an uneven number of stakes. Tack them down to a board with double pointed tacks, which can be procured at any hardware store. After the stakes are tacked down, spread them out, as shown in Figure 2. You will then have 21 stakes. Start the weaving by placing one end of the fiber cord under one of the stakes and over the other, keeping the hand on the end you placed under the stake, until you have gone around two or three times, after which the cord will hold itself in position. Proceed in this manner, going over one and under the other until you have woven to a diameter of 5½ or 6 inches. Now, take a saucer, turn it upside down and weave to the edge of it, as in Figure 3.

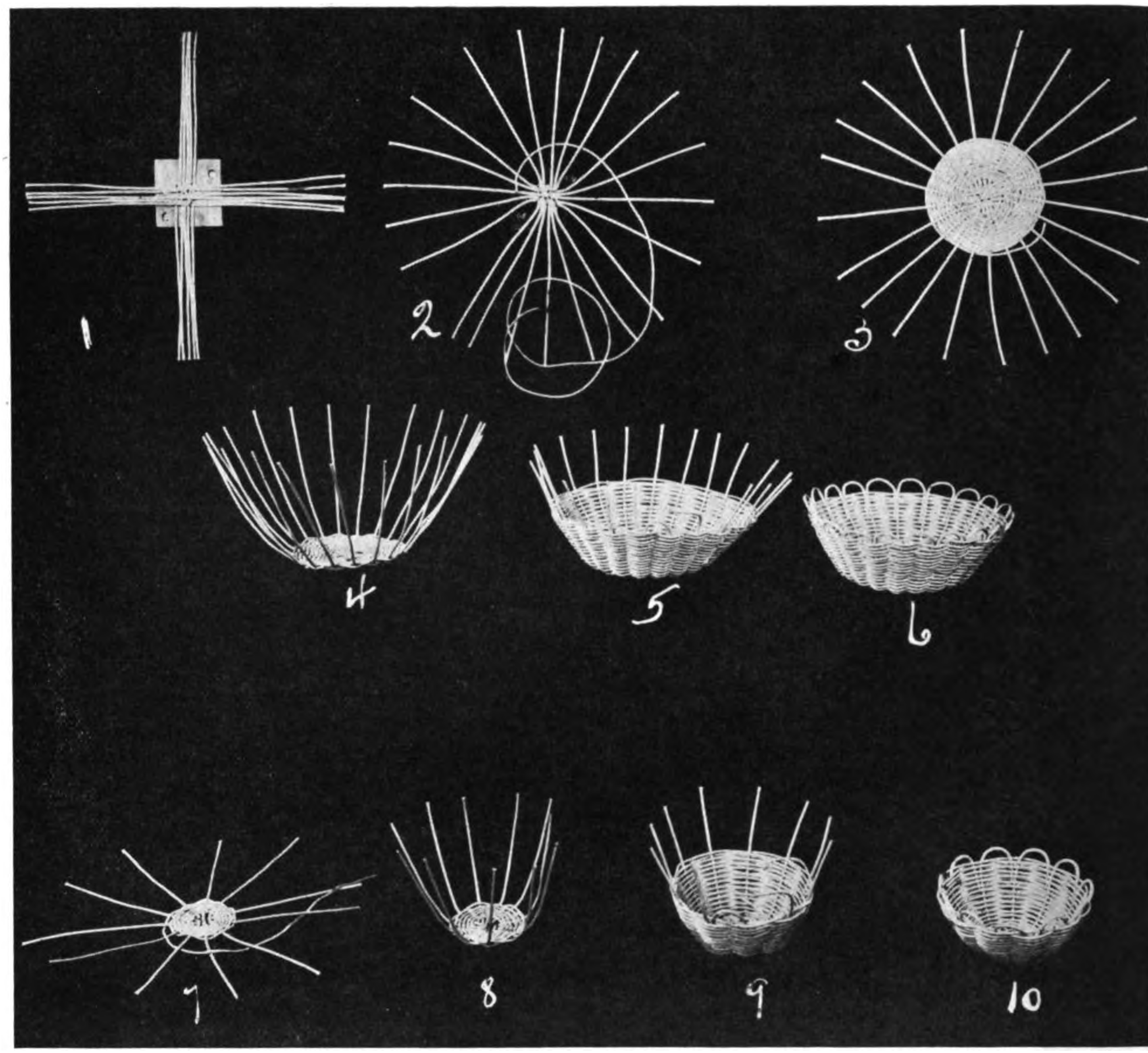
TYPICAL BASKETS MADE OF PAPER FIBRE.

A COMMERCIAL USE OF PAPER FIBRE.

The tacks are now removed and the basket turned over, placing the saucer under the part you have just woven as shown in Figure 4. Now continue the weaving to a distance of about three inches. Before cutting, be sure you have left enough of the fiber so it can be inserted behind the stakes, as in Figure 6. Trim the stakes so that they extend a distance of 3½ inches from the top of the basket, after which they are bent, as shown in Figure 5, and inserted one behind the other, using an awl or lead pencil to facilitate the operation.

Figure 6 shows the basket completed, which may be left plain or finished as desired. Water soluble stains can be used to stain the basket, the powder simply being dissolved in water, the basket dipped in the solution and left to dry. A coat of shellac or lacquer is then applied to protect the color and to add stiffness to the basket. Figures 7, 8, 9 and 10 are started in exactly the same manner as Figure 1, using less stakes, if a small basket is desired.

If the work is made up of white cord, the stain should be applied and allowed to dry before sizing. Oil and spirit stains should not be used. Oil stains penetrate unevenly, and spirit stains fade, largely due to



STEPS IN STARTING A BASKET WITH PAPER FIBRE.

the chemicals which are used in the manufacture of the paper from which the cord is made.

A sewing basket or a basket in which one would put a high priced vase, necessarily will be constructed along better lines. The weaving will all be securely fastened, and if done with the properly colored cord, needs no other staining, but merely finishing coats.

The finishing of the baskets presents an interesting problem, and a satisfactory finish may be produced by several methods. These are:

1.—Glue size.
2.—Caseine glue size.
3.—Lacquer.

The ordinary glue size has been used for years commercially and gives a very good finish at first, but it does not wear very well. In warm weather the glue is sticky and one must be careful not to touch the pieces with moist hands.

The glue gives a nice gloss to the work, and also aids in stiffening the basket, helping considerably to preserve its form and solidity.

Casein glue has been coming into favor lately as it is waterproof, and hence is not subject to the ailments of ordinary glue. Casein itself may also be used, and a very satisfactory size is made by using:

One pound casein.
Four ounces caustic soda.
One-half pound borax.
One gallon water.

This will make a very good dipping size. The quantities can be increased or decreased according to the requirements. It is understood, of course, that a dipping size is not as heavy as one that is brushed on. The advantage of a casein size is that it more or less waterproofs the fibre, then if the basket is used for vases, which oftentimes become wet from excess quantities of water, the fibre is not affected and resists the moisture, at the same time holding the finish better than ordinary glue.

Wood lacquer, however, is the ideal finish for this class of work. It is rather difficult to brush lacquer,

SOME ARTICLES OF WOVEN PAPER FIBRE.

but this material can easily be applied by dipping the small pieces. Larger ones can be brushed successfully, if the lacquer is reduced. A special thinner must be used, and for brushing 50 per cent wood lacquer and 50 per cent thinner will be found about right. The same proportion can be used for dipping also, altho this formula must be governed largely by the work in hand.

The wood lacquer stiffens the basket, and renders it waterproof, besides giving a satin-like finish that is a delight to the eye. We must here caution the reader against confusing wood lacquers with those lacquers that are commonly employed by the brass and metal industries. The metal lacquers are, as a rule entirely unsuited for the requirements of the finisher.

While excellent results can be obtained by brushing and dipping, the spray is the ideal method of applying the finishing coats. By this means, the lacquer or other material can be sprayed on in a smooth, even film, without showing any runs or sags. Every bit of the fibre can be easily covered, and also all the little pockets that are inaccessible to the brush.

The most popular shade is brown. While the Japanese brown produced with the spirit solution of Bismark Brown verges on the purplish mahogany color, it rather follows the shades of fumed oak. While it is understood that the brown produced with the spirit solution of Bismark Brown is a proper color for this kind of work, there is nothing undoubtedly more appropriate than a brown, ranging from a dark straw to the rich brown—almost seal in color.

Novelty finishes may also be obtained by "filling" the basket with a harmonizing shade of color before the final finishing coat is applied. Suppose we have finished a basket in ivory lacquer enamel. After it is dry, prepare a thin paste made of Burnt Sienna in oil, thinned with naptha, and with a little Japan dryer or varnish added for a binder. Now smear this mixture all over the outside of the basket. Let stand until it begins to set, and then wipe off the basket with a clean cloth. This will remove all the brown paste from the prominent surface of the basket, but all the depressions will have a tinge of brown. Many beautiful effects can be obtained in this manner.

PORCH FURNITURE MADE OF WOVEN PAPER FIBRE.

Shop Work in Continuation School Practical Art Classes

M. Norcross Stratton, Agent for Industrial Teacher-Training, Massachusetts Department of Education

WHAT to give the boys to do in the small continuation-school shop and how to carry on the work is a problem with many shop instructors. This is especially true in schools where only one activity—wood work—is offered. The following suggestions on the subject are made after five months of study and observation in many continuation schools and considerable first-hand experience in carrying on such work with similar groups in prevocational classes.

In many of the smaller communities the established manual training shops are used for continuation-school work. In some places new shops of a similar nature have been provided. Formerly many of the teachers either taught manual training in these same shops or in other places. Some of these teachers are using in the continuation school the same methods and the same "projects" that were or are used in the manual training in elementary schools. In some instances they are making the formal manual training models or exercises (the coat-hanger and taboret type) and a few are resorting to the "squaring-up-bits-of-wood" exercise method of the "dark ages" of manual training. Most of our continuation shop instructors realize that such work will not interest—and is of little value to the boys with whom they deal in continuation classes. These teachers are shaping their courses along more practical lines.

Woodwork does not appeal to all boys. A variety of work or simple work in a variety of materials, should be provided even in the small communities.

We have carefully refrained from suggesting any "courses" or any "series of projects." As in other innovations in school development, there is the grave danger that work in the continuation school will become formal and that the subject matter instead of the pupil will receive first consideration. We have therefore refrained from fixing attention upon "courses."

The shop instructor in the continuation school soon finds that he has a brand new problem on his hands. He discovers that he cannot interest the boys in the "same old thing they had before they left school." The individual project is almost impossible, as the shop must care for from ten to twenty classes a week. By the individual project method only a small portion of the work started would be in motion at any one time. This would result in much piling up of expensive material. Many boys leave before their projects are finished and then large quantities of partly finished and worthless articles would be stored away, broken up, or burned.

A class in a continuation school is made up of from ten to fifteen boys varying in age from 14 to nearly 16 years. They come from different schools, often different towns, with academic educational acquirement varying from that of the fourth grade to that of the first year of high school. Such a class often includes boys who have had manual training, practical arts training, or even some form of industrial training. There are boys now at work in all manner of occupations and trades. Considering all this it appears that the group-project method, often called the factory plan method, can best be adapted to the continuation school for beginners. Just now the boys are all beginners. This type of work should be carried on for all short term and intermediate term classes. Later the long-term boys who will remain in the woodworking shop may successfully be given individual problems.

The group projects selected should signify a real and worth-while need easily understood by, if not a real need of the boy—articles that may be sold or used in the school system. The workmanship should be "up-to-standard"—as near commercial standards as is possible with boys' productive work. The group project method interests the majority of boys more than any other method, provided each separate class carries its projects thru to completion. Boys like to participate in a community problem, they like to see a big job going thru, and they like to see it come out "as per specifications." These particular boys are working in industry and are used to seeing things done in a business-like way. Even the poor workman among them can point with pride to the completed job. "We made them" becomes their slogan. The group project plan develops teamwork and cooperation which help the boys at their employment and makes for better citizenship.

The objection is made that the method is excellent for the average boy, but not for the exceptional boy. He should be given extra attention. The exceptional boy may be interested if he is assigned work as a foreman or used to make jigs and templates.

The group-project plan requires fewer different

7 ASSIGNMENT CARD
and Time Card

Job #1 No. #2

Operation or Part #3

Date	Workman	No. Parts Completed	Time From	To	Total	Rating	Amt.
#4	#5	#6	#7	#7	#8	#9	#10
							(over)

FIG. 1. PUPILS' TIME CARD.

RECORD OF PROGRESS CHART

CLASS.
Day............
Hours...........

Names of Students	Getting out Stock	Planing in Jig	Sawing in Jig	Sandpapering	Hand Planing	Use of Hand Saw	Boring	Joints	Gluing	Scraping	Wood Finish	Band Saw	Lathe	Surfacer	Buzz Planer	Circular Saw	Misc. Machines	Sharpening Tools	Toolroom		Individual Projects										

FIG. 2. FORM FOR RECORDING ASSIGNMENT OF WORK AND RECORD OF PROGRESS.

projects, less material, and offers a better opportunity to dispose of the product. With only one or two well planned projects going on in a group, the instructor is able to concentrate his efforts on giving instruction instead of looking after the details, supplies and problems of a dozen or more different articles. The instructor is able to plan his work so that each individual boy is given work within his capacity and ability and progresses from week to week.

Related work is much easier to manage and plan than it would be if individual projects were carried on. Projects should be made more difficult as time goes on, but even so, there will always be simple parts for the newcomer to work out.

During early weeks of the boys' experience in the shop it is well to use jigs. By using jigs, the boys are able to establish the proper apperceptive basis. They gain a conception of a good standard in workmanship and an idea of the amount of time a job should take. To the average boy a demonstration or a sample is not sufficient to give the necessary apperception. Many a boy's failure in shopwork has been due to lack of a proper apperceptive basis. A muscular sense in handling tools is developed because when a boy is planing and sawing in a jig, he is compelled to operate the tools as the jigs guide them and he acquires the habit of handling the tools properly. The boys gain confidence when they have successfully produced a first-class job.

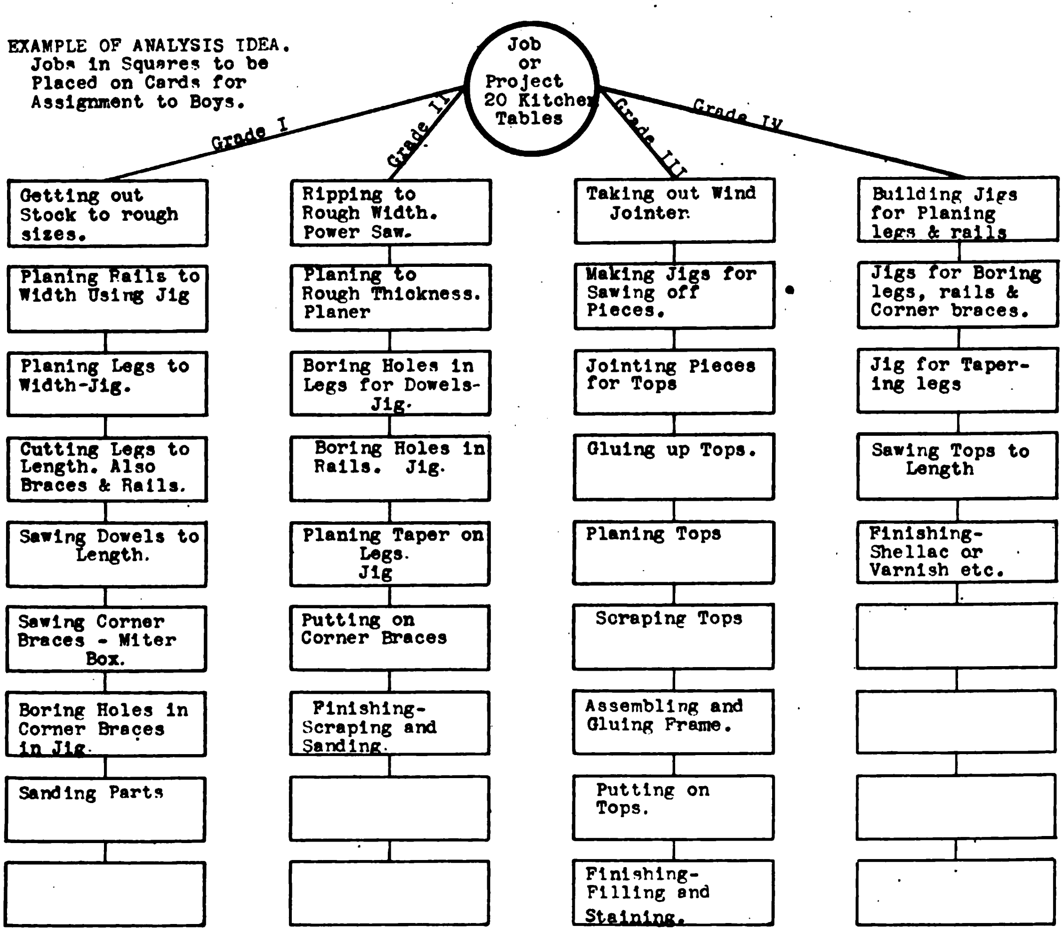


FIG. 3. ANALYSIS OF A JOB.

It also gives them an idea of what high standards are. Jigs should be discontinued after the necessary preliminary experience.

To prevent loss of time in assigning work, some system should be devised to take care of this task. It is also necessary with so many different boys of varying ability to have some scheme for keeping a record of work done to insure progression. The following scheme has been used to particular advantage at the Westfield Vocational School:

At this school all projects are analyzed by the instructor before assigning work to the pupil and the operations divided into four groups, according to difficulty. The various operations or parts of the job are written on separate cards. The simplest operations are listed in Group I and written on yellow cards; those a little more difficult are listed in Group II and written on blue cards; those still more difficult are listed in Group III and written on green cards; the most difficult operations are listed in Group IV and written on white cards. These cards are given to the boys at the beginning of the period or placed in an assignment rack from which the boy secures his own card before the period begins. The beginners or least skilled boys are given jobs on yellow cards. The boys will be given jobs found on yellow cards until they become capable of doing work for the next grade. This method interests the boys, is an incentive for them to produce good work, and helps to enable the teacher to see at a glance the boys' relative ability. To complete the scheme, red cards might be used for assigning work to boys on individual projects. These cards may be used as a combination assignment or time card. A sample card is shown (Fig. 1).

In addition to the card system, a chart for each class should be devised. Some such chart as that shown (see Fig. 2) is suggested. This chart enables the teachers to assign the work more accurately. It is absolutely necessary in a continuation school to have each day's work carefully planned so that none of the precious two hours of shopwork will be wasted. It is also necessary to keep a careful record of each individual boy's progress.

To successfully plan shopwork an analysis of the projects to be undertaken is necessary. The chart printed (Fig. 3) illustrates the method of analyzing the job of making twenty kitchen tables.

The job analysis is the shop instructor's lesson plan. The shop instructor must first think thru his project, listing out every part to be made and every operation necessary on each part. The operations should next be grouped according to difficulty in the four grades. The operations are then written on the cards for assignment to the boys. By analyzing in this way the instructor can check up his teaching. The new operations will be the lessons necessary to be taught to the boys assigned to do them. If the instructor makes a careful analysis he will be sure to have work for all his pupils to do, the work will be ready at the right time for pupils of varying ability, and he will know in advance what stock and materials to provide for the project and will check up his stock on hand to make sure that the job can be completed.

TEACHING FIFTH GRADE WOODWORK

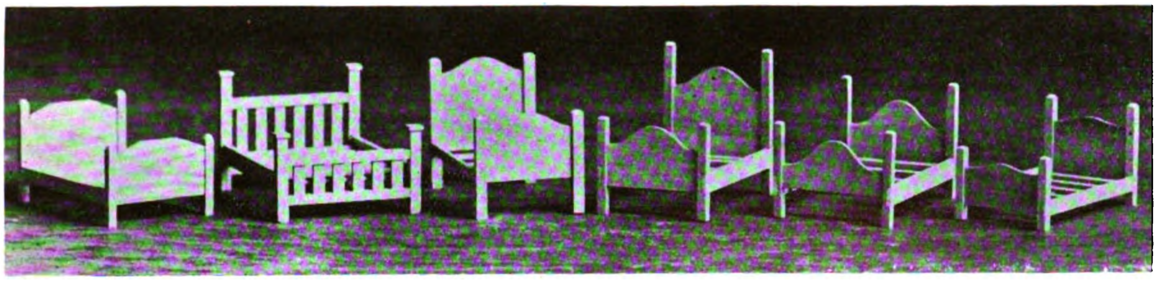
II. DOLL FURNITURE

Fred L. Curran, Supervisor of Practice Teaching, Stout Institute, Menomonie, Wis.

THE fifth-grade boy needs a great deal of outdoor exercise and play and his mind is easily led by suggestions of outdoor activities. The windmill, the cart, the wagon and the wheelbarrow are problems which interest him from this viewpoint. To keep his mind developing rationally, his interests must be developed in many directions and the doll furniture projects offer some interesting possibilities.

As fifth-grade work, the doll furniture such as described in this article should not be begun until the last half of the year. By this time the boy should be able to

SOME FIFTH-GRADE DOLL FURNITURE.



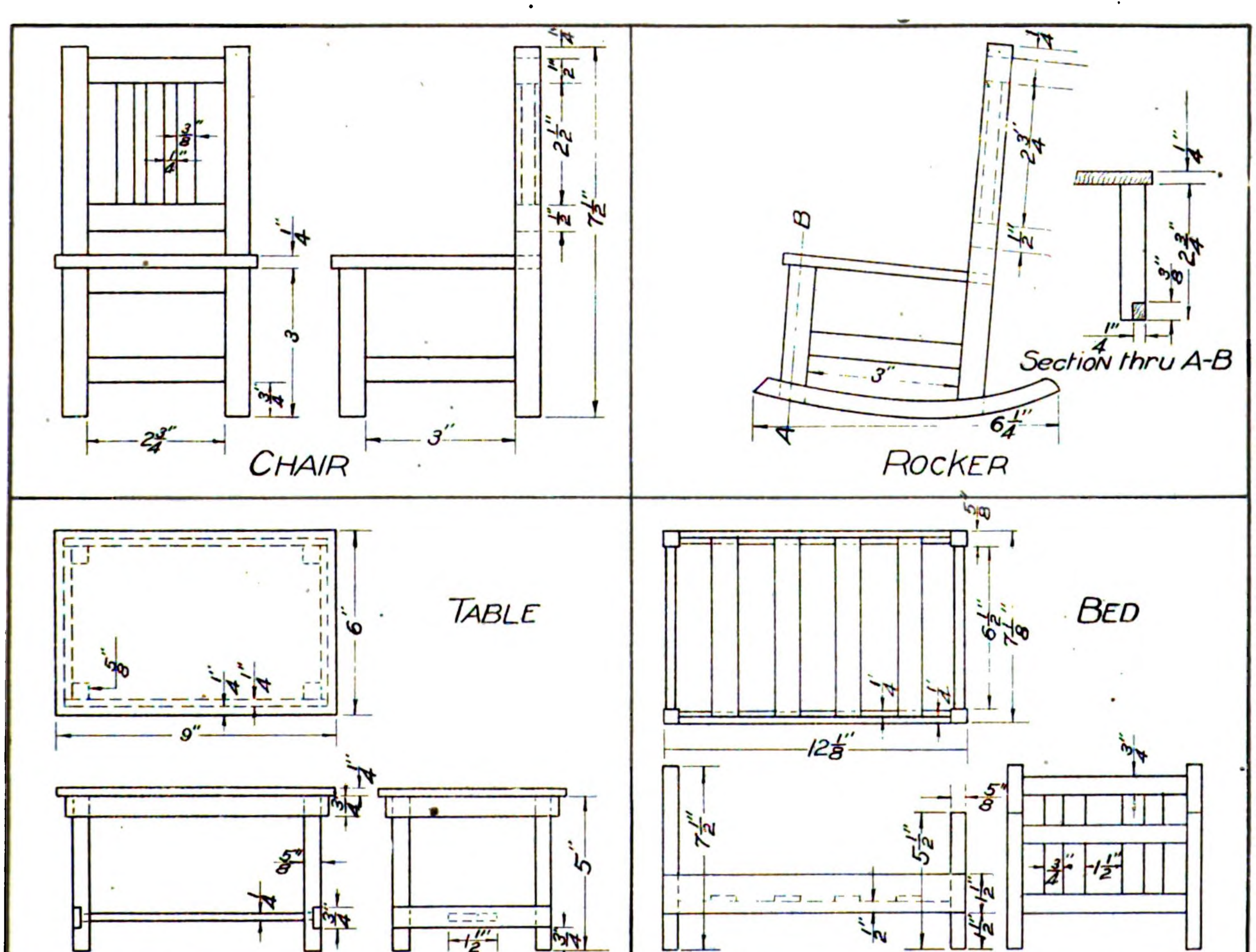
SOME VARIATIONS OF DESIGN FOR DOLL BED.

measure accurately to one-sixteenth of an inch, saw ends square and use the hammer well and carefully in nailing.

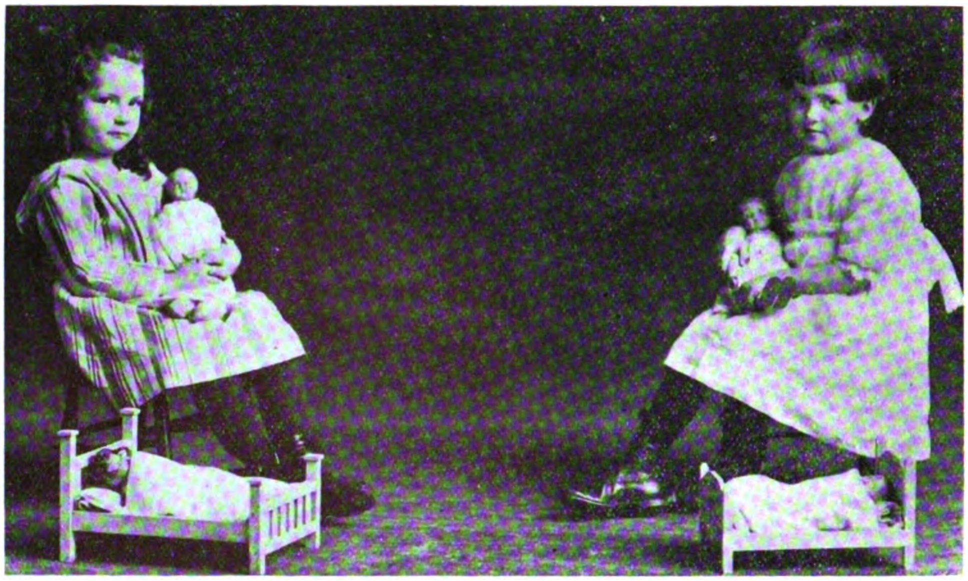
The four pieces shown in the drawings have been made for several years in the fifth grades and always prove interesting to the boys. They are designed with the thought that the chisel and plane will be used very little. The stock is reduced to thickness and width in the mill and the work left for the boy to do is largely measuring and laying out accurately; sawing carefully to line; and assembling. Here as in the windmill the teacher must demonstrate thoroly and often.

There are two important points to emphasize in teaching the lessons in doll furniture: First, the accurate measuring and cutting of the pieces to length and the sawing of the ends square; second, the nailing must be done carefully with long enough brads to make it strong.

In designing doll furniture most attention should be given to the proportion and general appearance. The types of joints used must be suitable both to the use of the finished projects and to the abilities of the boys who are to make them. Butt joints are used extensively and are quite strong and satisfactory when fastened together with long slim brads driven at an angle when possible. In fastening the side rails to the posts in the bed problem, it is necessary to notch the post and set the whole end of the rail in flush with the side of the post. This is a strong joint and one that the boys can make well. This joint is also used in the table where the lower end rails are fastened to the posts. Basswood is a good wood to use in these problems altho soft pine, butternut, whitewood, cypress and poplar are satisfactory.



DETAILS OF DOLL FURNITURE.



THE DOLL BEDS IN USE.

The projects when finished may be left in the natural wood or they may be painted white. The painting takes considerable time and is quite difficult work for the fifth-grade boys. If the classes are large it had better be omitted.

There are many pleasant associations that develop thru the making of doll furniture. The boys usually find opportunities to give it to their sisters or friends and if the right spirit prevails in the class, this making with their own hands and giving to some one who will enjoy it is highly beneficial in the life of every boy. The teacher should endeavor to promote the proper spirit by telling about the work of other classes, by asking questions of the class as to what might be a good thing to do with the doll furniture when finished, and by talking with individual boys in the class to find out what they would like to do with their pieces when they are finished. The success of this type of work will depend very largely upon the spirit of the class and their attitude toward the disposition of the finished work.

HOUSEHOLD MECHANICS

J. H. Trybom, Director of Industrial Education, Detroit, Mich.

DURING the past few years, many attempts have been made to enrich the courses in manual training. The theory that the greater the number of points of contact that can be established with various lines of industrial work, the better for the pupils, has gained many adherents. The "household mechanics" course is an attempt in this direction, with the possible added advantage of giving each student an opportunity to find out in what line his own ability and interests lie.

Household mechanics can serve as an elementary "try-out" course, as it involves a great variety of constructive exercises representing several of our common trade occupations. On the other hand, the old manual training idea—that a thing must be well done to accomplish the educational results that we are after—must not be sacrificed. At any rate, we as teachers should at all times be able to state that the completed exercise represents the pupil's best effort.

The immediate purpose of the course is—to give the boy a thoro knowledge of the use and maintenance of the various household appliances, involving various kinds of repairs, so as to secure efficient use of these appliances.

Household mechanics was introduced into the Detroit Public Schools manual training course, in the fall of 1917; six schools were equipped at that time. At this time there are 31 grade schools—three intermediate schools—and three high schools (6-year) equipped for this work.

This course is generally given to the students of the eighth grade; but in accordance with our new program for the intermediate schools, it will be given to all boys in the seventh grade.

The course is the result of the work of several committees of manual training teachers. The name of Mr. Earl L. Bedell should be especially mentioned in this connection, as he has had a great deal to do with the contents and organization of the course in its present form.

Contents of the Course.

1. **Building Materials. Names of—and how to order—the materials commonly used in building. Writing a lumber order.**
2. **Building Construction. A study of the various parts of the building; and continuation of the study of materials.**
3. **The City Building Code. A study of the procedure necessary to get a permit to build a new building or remodel an old one. Study of the requirements of the code.**
4. **Sharpening Tools. Study of the methods and practices in sharpening bevel and wedge-edge tools, saws, and lawn mowers.**

5. **Soldering.** A study of the principles of soldering; and practice in the use of the soldering iron, and in making some minor utensils.

6. **Glazing.** A study of the mixture of putty; and practice in its use.

7. **Nails and Screws.** A study of the correct use of nails and screws; applied on some special problems under construction.

8. **Paints and Varnishes.** Composition of good paint. Use of dryer. The principles of painting. Varnish removing. Refinishing of old furniture.

9. **Locks.** A study of different kinds of locks, and their mechanism; with practice in the setting of locks.

10. **Hinges.** A study of the sizes and kinds of hinges; and practice in setting hinges.

11. **Furniture Repair.** Study of fastening with glue, screws, angle irons, etc.; and practice in the repair of furniture.

12. **The Water Supply.** How the water is supplied; valves and their purposes; location of water pipes. Reading of water meter.

13. **The Range Boiler.** Circulation of warm water, illustrated by experiments. Connections and methods of heating.

14. **Faucets.** Types of faucets. Specifications, and repairs.

15. **Traps.** Kinds and purposes of traps. Ventilating; with actual practice in cleaning.

16. **Flush Tank.** Mechanical construction. Purpose. Study of minor repairs and adjustments.

17. **Electric Bells.** Electric door bell construction; current supplied by cells or transformers. Bell wiring problems.

18. **House Wiring.** Principal parts of house wiring system. Testing and replacing of fuses.

19. **Heating by Electricity.** General principles of electric heating. Electric heating elements in common use —as in flat irons, toasters, etc.

20. **Motors.** A study of a small motor, in use in carpet sweepers and washing machines with minor repairs.

21. **Fuel.** Different kinds of fuel. Cleaning of gas burners; and adjustment of air mixture.

22. **Hot-air Furnace.** Air circulation. Regulation of drafts. Cleaning of flues and grate.

23. **Steam-heating Plant.** A single-pipe steam-heating system; and principles of operation.

24. **Hot-water Heating Plant.** Circulation of hot water; and principles of operation.

25. **Refrigerator.** Principles of refrigeration. Non-conducting materials. Drainage. Economy of maintenance.

HOUSEHOLD MECHANICS.

Standard Equipment.
(Added to the regular Wood-shop Equipment.)

Builders' Hardware.

1 doz. pr. Butts, ball tipped pins, 3" x 3".
1 doz. pr. Butts, loose pin, 1¾" x 1⅞".
½ doz. Catches, cupboard, German bronze, Buhl & Son Cat. No. 05367.
1 Hasp, safety, 4½", galvanized, wrought, Rayl. Fig. 1493.
½ doz. Hinges, wrought, ornamental, 3⅞", corrugated (Butterfly), Rayl. No. 1416.
½ doz. Lock Sets, mortise, for inside door, japanned iron case, 3½" x 3¼", wrought steel front, one tumbler, reversible.
1 Padlock, 1½", with 2 keys similar and equal in quality to Yale & Towne Intrepid No. 534J.
5 lbs. Tacks, cut No. 2.
5 lbs. Tacks, cut No. 4.
1 pr. Window Sash Locks, wrought steel, double inverted, Buhl & Son Cat. No. 1231.
1 pr. Window Sash Lifts, 1⅝" x 4", cast metal; Buhl Cat. No. 701864.
4 Window Frame Pulleys, front, 4⅞" x 1", diameter of wheel 2", Buhl Cat. No. 42.
100 ft. Wire Cloth, 20" wide, black.

Electrical Equipment.

4 Bells, iron box, 2½", Menominee.
2 Buzzers, iron box, 2½", Menominee.
2 Fuse Blocks, two circuit, 30 amp., 110 V., D. B. block, 2 wire.
1 Meter, recording watthour, A. C., 110 volt, 2 wire.
1 Motor, ¼ H. P., A. C., single phase, 110 volts, 60 cycle, for washing machine.
1 Motor, 1/6 H. P., Universal, single phase, 110 volts, for vacuum cleaner.
6 Plugs, attachment cords, Benjamin No. 903.
12 Push Buttons, wood, No. 1166.
1 doz. Receptacles, Fleat, trade No. 69001.
2 Sockets, chain pull.
2 Sockets, two plug (way), cluster No. 92.
6 Sockets, key, strain relief.
1 Soldering Iron, electric, American Beauty No. 3138.
1 Switch, lever, double pole, single throw, trade No. 128634 A.
4 Switches, two pole, wooden base, for 3 to 6 volts, about 1½ amp.
1 Transformer, bell ringing, Dongan Jr. P.

Electrical Supplies.

50 ft. Cord, electric light, C. C. No. 18.
6 Dry Cells, Columbia.
2 doz. Fuses, plug, 10 amp.
4 lbs. Staples, common ⅝".
2 lbs. Staples, insulated.
6 1-lb. rolls Tape, friction.
1 1-lb. roll Tape, rubber.
2 1-lb. coils Wire, bell, No. 18, C. C.
200 ft. Wire, rubber insulated, No. 14.

Glaziers' Supplies.

1 lb. Glaziers' Points.
10 lbs. Putty (in sealed can).
10 lbs. Whiting.

Plumbing Equipment.

2 Basin Cocks, compression, ¼", for iron pipe, porcelain indexed, nickel finish.
2 Bibb Cocks, compression, ½", for iron pipe, T-handle, brass finish.
2 Bibb Cocks, compression hose, ½", for iron pipe, T-handle, brass finish.
2 Bibb Cocks, Fuller, ½", for iron pipe, porcelain indexed, nickel finish.
1 Cesspool Cover with bell trap, 6" x 6", iron strainer.
1 Faucet, bath tub combination, Fuller, porcelain indexed, nickel finish.
3 Floats, round, 5".
1 Flushing Tank, low down, elevated supply valve, copper lined tank, float valve.
2 Sill Cocks, compression, ½", for iron pipe, wheel handle, brass.
1 Sink, 18" x 30"; cast iron, flat rim, enameled.
2 Traps, drum, cast iron, Park and McKay, page 430.
2 Traps, S, long S for sink collar, cast iron, Park and McKay.

Plumbing Supplies.

4 doz. Gaskets for compression faucets, ⅝", composition rubber.
2 doz. Gaskets for Fuller faucets, ⅝", composition rubber.

Tinners' Supplies.

2 lbs. Resin, in good sized lumps.
2 lbs. Salamoniac, large pieces.
3 ¼" boxes Soldering Paste, "No Corrode."
5 lbs. Solder Wire, spool, 50-50.
5 sheets Tin, I. C., bright, 20" x 28".
2 lbs. Tinners' Rivets.
1 Wrench, Stillson, 6" (pipe).
1 Wrench, Stillson, 8" (pipe).

Tools and Appliances.

1 Fire Pot, one burner, ¼" pipe connections, Johnson (Detroit Gas Co.).
6 Glass Cutters, multiple disc, Millers Falls.
2 Hammers, cross peen, 12 oz., Maydole.
2 prs. Pliers, cutting, flat nose, No. 50 Red Devils.
4 prs. Pliers, cutting, round nose, No. 645 Red Devils.
4 Putty Knives, Lamson.
6 Screw Drivers, 3", Champion, regular.
2 prs. Snips, tinners', 2" cut.
1 pr. Snips, tinners', curved 2" cut.
2 prs. Soldering Coppers, 1½", common.

Methods of Teaching.

These equipments have been installed in our regular manual training rooms in the elementary schools. As

the list shows, only a comparatively small equipment is allowed for each branch of work. The teacher has to organize his classes into groups of four to six pupils, each group being occupied with one particular line of work. This arrangement involves a good deal of organizing ability on the part of the teacher. His main effort should be directed towards keeping all the students of the class profitably employed. For this purpose, he will find it advisable to have a "student-foreman" in charge of each group; these students, having previously done this work, are familiar with the various exercises. They will receive excellent practice by this opportunity of assisting as teachers. We have found this arrangement works well in most classes.

Teachers' Training.

Manual training teachers cannot successfully undertake the instruction in this subject, without some special training. Altho the exercises may be familiar to a good many teachers, they would have some difficulty in undertaking this work without some special training in the methods of teaching and organization to be employed. Our teachers of household mechanics meet once every two weeks, in the evening, for a two-hour lesson, all the various constructive exercises are demonstrated and carried out in this course, and, besides, there is a good deal of emphasis placed on methods and organization.

It is evident that manual training has never been appreciated by parents in this city, to the same extent as at the present time, or since this course was introduced. Numerous reports from teachers and principals all agree on this point. On the other hand, if wholehearted purposeful activity is the cornerstone upon which education is built, the possibilities of household mechanics must be of considerable significance in this respect also, both in school and in the home. Such experiences as the successful repairing of a faucet, for instance, resulting in a saving in expense—and commendation from parents—must contribute to the growth of the child.

A PROJECT: THE MAKING OF A BOOK*

Helen M. Stockton, Supervisor of Fine and Industrial Arts and
Georgiana Johnson, Sixth Grade Teacher, Westfield, N. J.

The following outline was used in carrying out the project:

- I. Conception of Project—to be gained by teacher from study of books and reference reading.
  - A. Text or content of book.
  - B. Type of printing.
  - C. Type of cover.
  - D. Type of binding.
- II. Planning of the project.
  - A. Type of book to be made.
    - 1. Content.
    - 2. Type of print.
    - 3. Size of book.
    - 4. Method of binding.
    - 5. Method of printing.
    - 6. Illustration of text.
  - B. Materials necessary for the project.
    - 1. Kind.
    - 2. Size.
    - 3. Approximate cost.
  - C. Process involved.
    - 1. Printing.
      - a. Lettering.
      - b. Block printing.
      - c. Illuminated lettering.
    - 2. Paper making.
    - 3. Assembling.
    - 4. Covering—binding.

This project was the natural outgrowth of a series of lessons on lettering. The children had been studying lettering in their art classes and had become intensely interested in the different types of letters and the derivations of these types. Many of them had begun collecting examples of different styles of type from magazines and newspapers. These they had kept in boxes or envelopes, according to individual taste. All felt the need for a container of some sort, so it was decided that a scrapbook be made.

Types of scrapbooks were discussed and also the possible content of such a book. During the discussion, the idea of writing a book which would contain the necessary information about lettering developed. The idea of the scrapbook was dropped, and the children became enthusiastic in their desire to write, bind and own a book containing this desired information. They suggested numerous references and places where material relative to the subject might be obtained. The teacher supplemented this list and work on the project began in earnest.

Next followed a discussion of reference work done and selection and rejection of topics for the book. After much discussion, five topics were decided upon. The first, which was to be chapter one, was "The History of Writing"; the second, chapter two, "Origin and Early History of Paper Making"; third, "The Manufacture of Paper"; fourth, "The Invention of Printing"; and fifth, "The Printing Press." These five topics were later divided into subtopics. Each child then wrote a paragraph upon each of the subtopics. These paragraphs were then read to the class and the children decided upon those which were to go into the book. One paragraph on each subtopic was chosen and all then fitted together in order to complete the chapter. Care was taken that different children's work was represented.

The "Origin and Early History of Paper Making" was then taken up and treated in the same way as the first chapter. The writing was done in the period generally given over to English. The study of the modern manufacture of paper naturally followed the early history of paper-making and took the form of an Industrial Arts lesson, in which paper was actually made by the children. As the classroom was not very well adapt-

* This project was carried out in the sixth grade of the Lincoln School, Westfield, N. J.

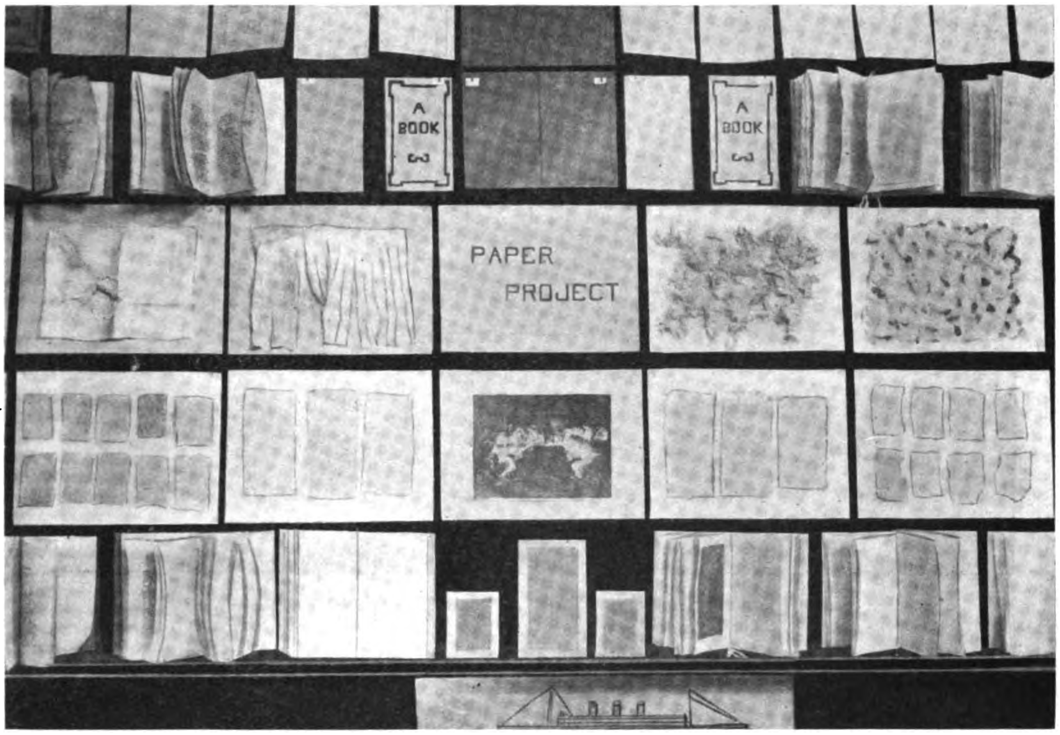


ILLUSTRATION 2. AN EXHIBIT OF MATERIALS USED IN THE BOOK MAKING PROJECT.

ed to a lesson of this kind, the class journeyed to the kindergarten room, where they could work in groups more easily and where the situation as a whole was less formal.

The children brought old linen rags from home, which they shredded (see illus. I and II). The teacher then boiled this shredded linen in caustic soda and rinsed it by placing in a sieve and running cold water thru it. This process was demonstrated by the teacher because the acid used was far too powerful to be placed in the hands of children. After the teacher had cleansed the fiber, she turned it over to the children and they added cold water and starch to the pulp. The next step was that of coloring. Five different colored dyes were on hand, and each pupil dyed his pulp according to his particular taste. This eventually resulted in a variety of attractive colored papers. The children then felted the fiber, using molds and deckles which the boys had made for that purpose in the manual training class. The fiber was then removed, placed between pieces of muslin and pressed between the rollers of an old clothes wringer which had been borrowed for that occasion.

Finally, the children sized the paper with gelatine, and dried it with a hot iron. These samples were later pasted into the book, under an appropriate heading. The lesson closed with a discussion of the value and extent of the paper-making industry.

The next topic was: "The Invention of Printing." This was dealt with in a socialized recitation in English. The children discussed the topic in class, went out and foraged around for information relative to the subject, and then came back to class and reported the results of their investigations. Topics and subtopics were chosen as in the first lesson and compositions written upon each subtopic. The compositions were duly criticised by the class and the best selected to go into the book.

This lesson was followed by a drawing lesson which dealt with the planning of a cover design. A suitable size and appropriate title were selected for the book, and a careful examination of numerous covers was made.

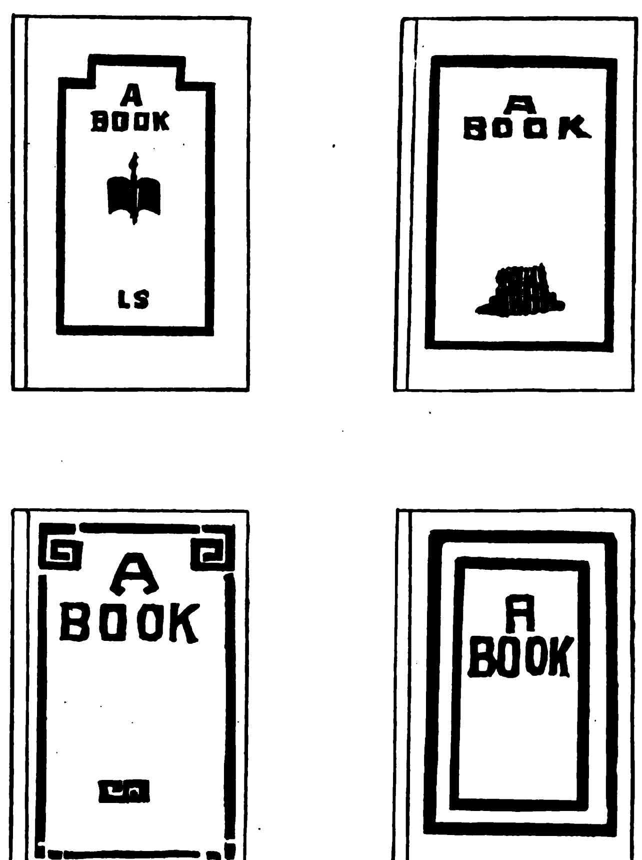


ILLUSTRATION 3. COVER DESIGNS BY THE PUPILS.

ILLUSTRATION 1. THE CLASS AT WORK, MAKING PAPER.

These were discussed at some length and the ideas of appropriateness, simplicity and balance were stressed. Each child then designed a cover on rough paper. These designs were duly submitted to the class for criticism and the best eight selected to be cut from linoleum (see Illus. III).

While the interest in printing was at its height, a visit to the printer's was decided upon. The class was taken to a nearby printer's, where a demonstration of the modern methods of printing was witnessed. Emphasis was placed upon the fact that in the old method of printing, the paper was stationary and the blocks or letters were inked and pressed upon the paper, while in the new method the type is set and the paper is pressed upon it. The children saw that the type was reversed when set up, and realized that their designs for the linoleum blocks must be reversed before being cut. They brought old pieces of linoleum from home and different members of the class volunteered to do the cutting, most of which was done during recess or noon time.

We were now ready for the block printing. Each child was allowed to select one of the eight designs cut of linoleum, and after a short discussion on color, each pupil selected his vellum, cover paper and paint. Ordinary water colors mixed with a little glue were used for the printing. This allowed for a great variety of colors. A pad of newspaper was placed under each cover paper, and the covers printed by the children.

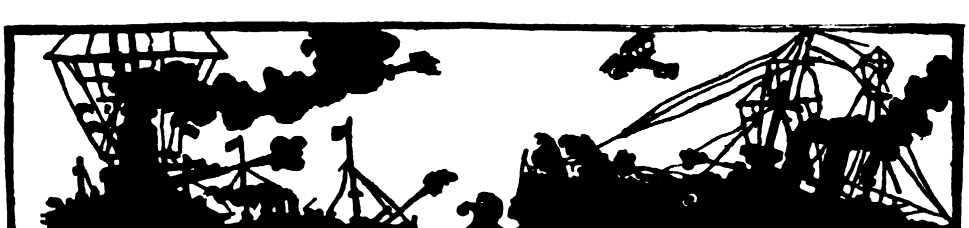
The cover designs printed, they were now ready for the actual binding. The covers were made of strawboard hinged together with vellum and then the cover pasted in place. As no press was available, the children put the covers in their geographies and sat upon them. At the close of school the covers were carefully piled under a drawing board upon which bricks were placed.

In due time the proof of the text came back from the printers. The children were given exercises in proofreading and corrected the proof.

When the final copy was delivered, excitement ran high and they were indeed eager children who assembled the sections and sewed them together. These they then bound in the covers and pressed.

The final lesson was spent in drawing and illuminating initial letters which had purposely been omitted in the proof, the mounting of the photographs, and samples of the paper made, and the pasting in of appropriate illustrations.

Pictures of the class at work were taken and each child had one to mount in his book. On the last leaf of the book were autographs of the contributors—every member of the class.



SOME PROBLEMS IN MECHANICAL DRAWING

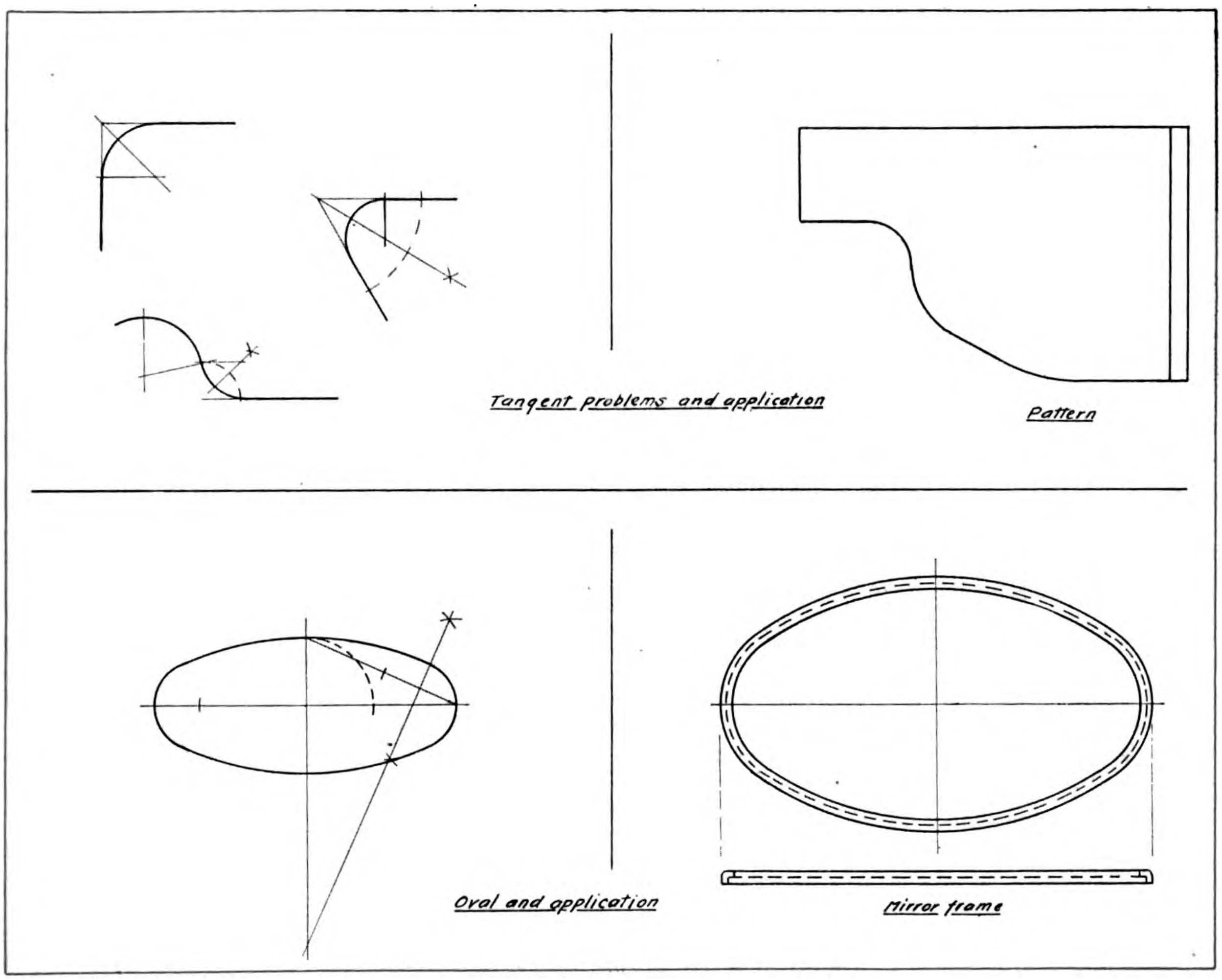
Hans W. Schmidt, Madison, Wisconsin

ONE of the first things taken up in teaching mechanical drawing has to do with the proper use of the T square, triangles, scale, pencil, etc., and the orthodox procedure is to fill in numerous squares on the drawing paper with lines, straight, slant, criss-cross, at angles varying from 90 degrees to 15 degrees, curves, concentric circles, intricate geometrical designs and what not. All this in the fond belief that after all this has been accomplished the student will be able to delineate correctly, join his lines correctly, use compasses and not drag or back up on his pencil. As a disciplinary exercise method this might have value if all of the last stated results were accomplished. Unfortunately this is not often the case; observation in the field of supervision has satisfied the writer that the method falls far short of accomplishing what it set out to do. The first few lines are drawn with care—the rest are usually hurried along and but few sheets that the writer has seen show evidence of real progress.

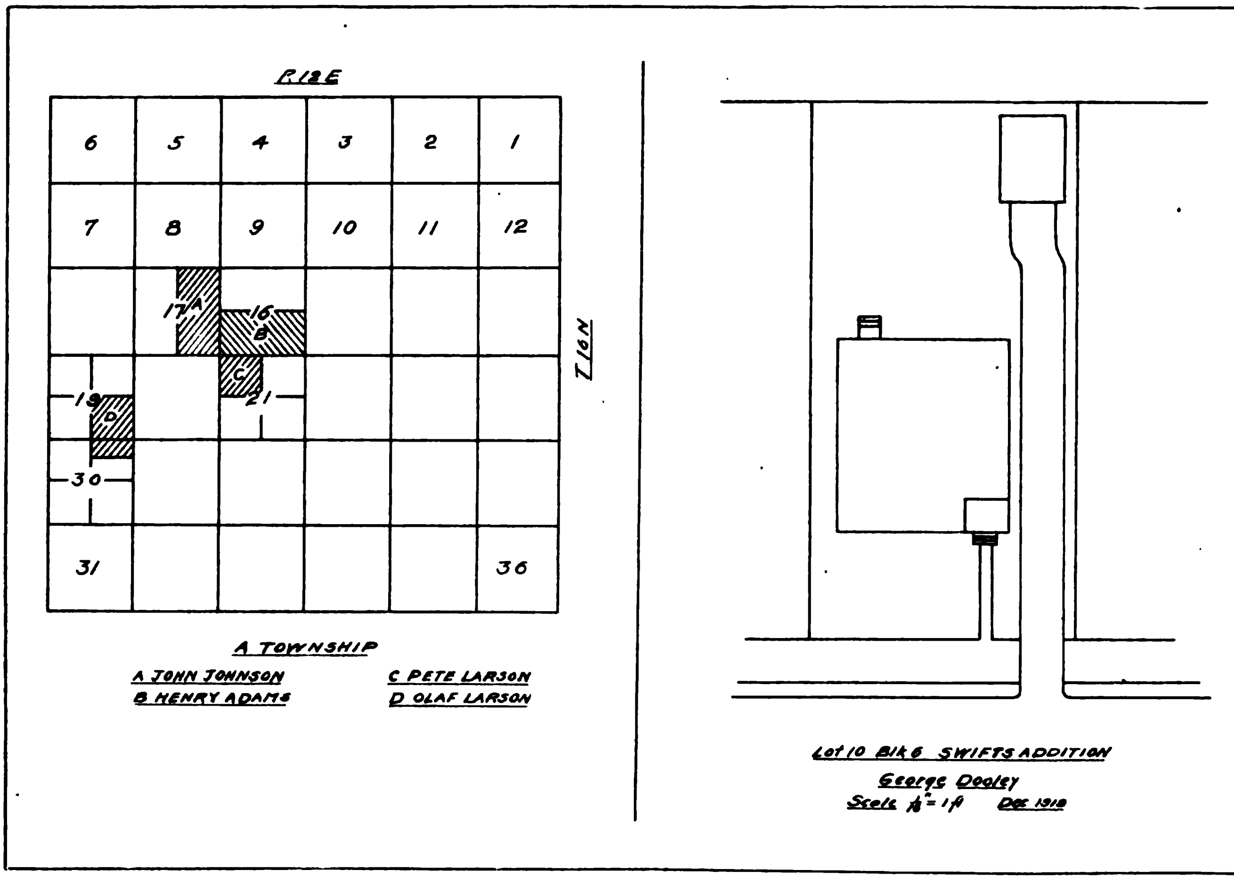
It would seem that a lack of interest in the problem is one of the contributory causes; another one is that the ends for which the problems are utilized are in many cases too far remote—a point often lost sight of and of decided bearing on the whole problem; yet another is that such exercises do not function in terms of applications. Conferences with a goodly number of teachers seem to bear out the above contentions.

Would it not be a better way to interest the student in his work in the very beginning by giving him "exercises" which are of interest, problems which he recognizes as worth while, work which necessitates careful attention and which incidentally gives a wealth of information and which necessitates thinking on the part of the students? It would not be a difficult thing to work out problems of this type of "projects" if you prefer that term—it is strictly au fait at present. The writer has made a number of suggestions to teachers along this line and it may be worth while to set forth a few of them here for the benefit of the general reader.

For one of the first problems in delineation why not develop a drawing of a township, properly numbered and designated by its locale? This will permit attention to pencil technique, scaling, etc. It is surprising



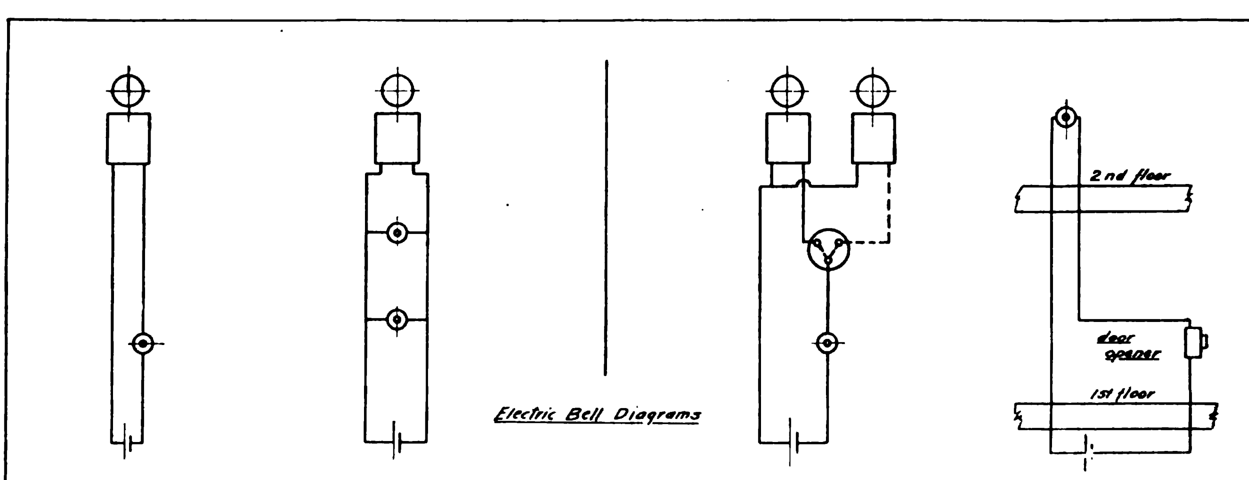
TYPICAL APPLICATIONS OF PRINCIPLES OF MECHANICAL DRAWING TO WOOD WORKING PROJECTS.



TYPICAL TOWNSHIP PLAT.
A Use for Mechanical Drawing in a Rural School.

how few people know how a township is laid out, how numbered and where in such a township a plot of land is located. In rural high schools especially this constitutes a real problem which touches very vitally upon the local situation and is certainly worth while. A step further: locate the town or village as per records on file or as per description in the articles of incorporation. Why not plot the holdings of the parents of various members of the class? It is not a far step to making a plat of a city lot and house. The latter necessitates freehand sketching and dimensioning as a prerequisite to the work in hand and at once shows the relation between the two, aside from the practical training in sketching it gives. There is no question as to the interest displayed and the drawings now partake of real problems involving a vital self-interest, a powerful incentive to good work and attention. They contemplate the interesting information you are dispensing and how you are developing proper coordinations of the mind and hand; the student has to do some real thinking and the joy of creation is with him.

But you want to draw circles too, and concentric ones, and maybe an arc or two so that your students will get the "hang" of the compass. Could we not use an electric bell circuit or two for this purpose? Let us look at the drawings accompanying this article. There

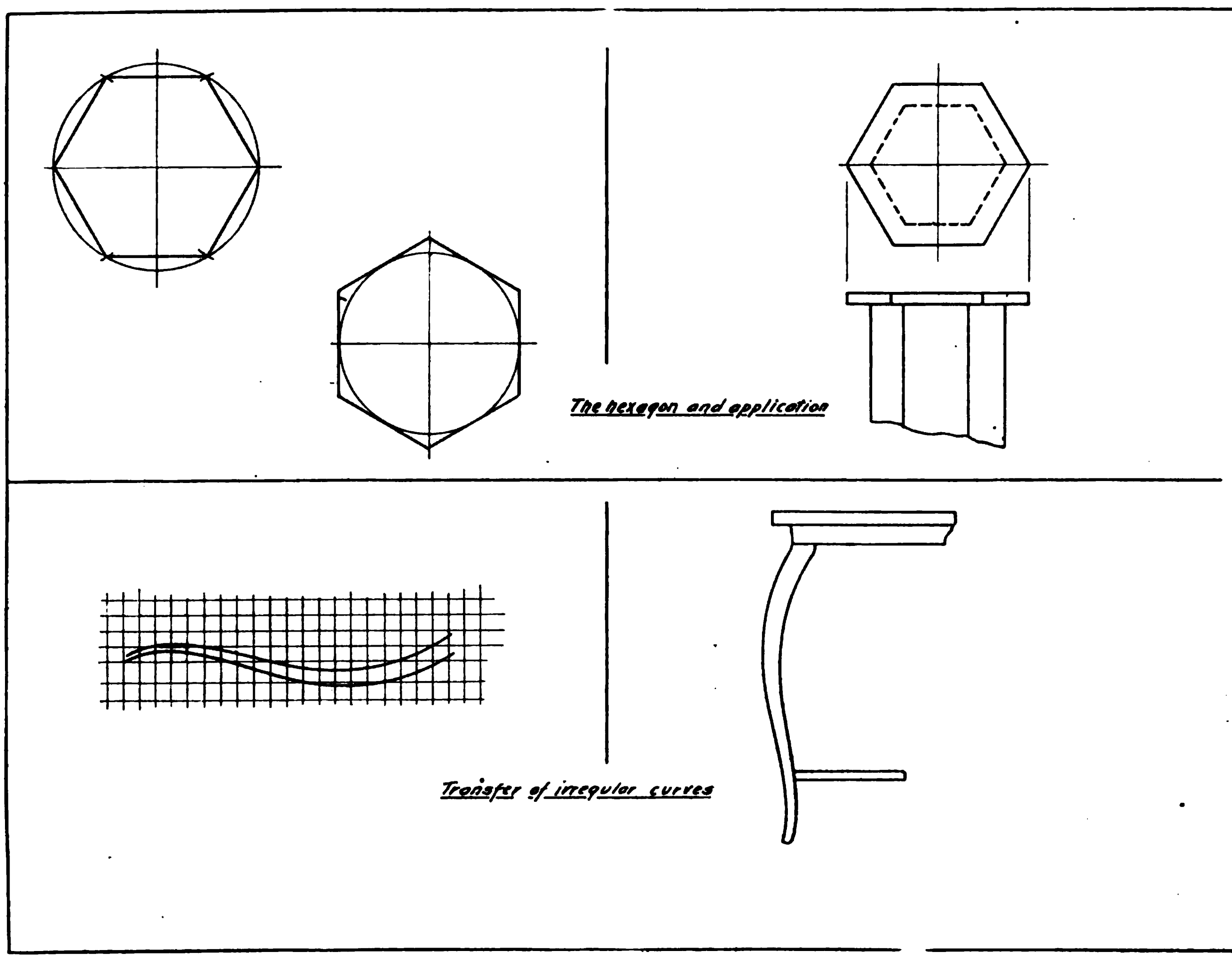


WIRING DIAGRAMS USED TO ILLUSTRATE CIRCLES AND STRAIGHT LINES.

are circles, concentric ones if you want them, straight line work, "junction" points, even broken lines. Can one wonder if the boys prefer this type of work to the exercise? It is all elementary work; plain delineation, single plane work, no projections, orthographic or isometric, no multiple view drawings; yet stimulating mentally, productive of real practice with instruments, and pencil besides representing good pedagogical procedure. The writer is quite sure if such work is pursued—it only needs a little planning and forethought—it ultimately also puts a teacher on his mettle to provide an interesting type of work when he comes to a more formal presentation of the work. And it is well that such is the case. We draw too many connecting rods, cams, and this and that, because the book says so or "it is in the course." The student does as he is told to do by the teacher, not often is he initiated into the reasons and purposes underlying much of the work nor is he given an insight into what the teacher is trying to accomplish. Would the boy react any differently if he were taken into the confidence of the teacher than if he were left in ignorance of the intents?

A short time ago the writer visited a class doing geometric constructions; there were four sheets with six problems on each, a total of 24 problems. A canvass of the students disclosed that less than half of them knew what geometric constructions were used for and but few could pick out one or two applications. Even the teacher found great difficulty in giving applications to mechanical drawing work for more than half of the problems being drawn. This is not an isolated case and it is feared that geometric problems are much *abused as means when no ends are in sight.* Retrospection on the part of teachers will likely disclose to them the truth of this.

A very little thought will show that a process of elimination among the usual problems is necessary and if one has to spend ten minutes in thinking up some application for any problem it had better be discarded, even "if it is in the course." It would seem an easy matter to clinch applications and follow a good procedure by presenting the geometrical construction and an application or two beside it. Students are not apt to mistake these constructions for exercises when the subject is presented as suggested. Try it on your drawing board.



GEOMETRIC PROBLEMS APPLIED TO FURNITURE.

While we are on the subject of drawing, how about exercises in lettering? Most students consider this part of their work drudgery and one cannot blame them much for this attitude when we see some of the methods used. Large sheets, eleven by fourteen inches, ruled with fifty or more lines and filled in with what is called

"lettering"—a most discouraging outlook and like woman's work, "never done." Why not substitute for the above small cards, say three by five inches, with four or five lines on them, to be filled out at the beginning of each period, until proficiency is being shown? Each card is complete in itself—it is a definite assignment; satisfaction, as a completed piece of work, goes with it. It permits the teacher to correct mistakes and apply remedial measures when the mistakes are still fresh in mind. The corrected cards are returned to the students daily. If the cards are arranged in chronological order they will show at a glance whether progress has been made or not. If the latter, it is a fine check upon the teacher as well. It checks the method and shows whether proper care has been exercised in detecting slovenly work. It works both ways and a student when confronted with his record has no recourse to excuses.

Another thought in this connection. Many, too many, drawings are spoiled by poor, slovenly lettering. Why not prohibit lettering or titleing until a fair degree of proficiency has been reached in the art? Placing the name, inconspicuously, on the back of the sheet will suffice for identification until the proper time for doing good lettering has arrived. This scheme will prove an added incentive for doing good lettering; the boy who has six or ten plates unlettered as compared with others having but one or two, soon begins to perk up—competition among boys is strongly developed and no youngster relishes having a "black" eye in the minds of his fellows even if his optics show no physical evidences of having been tampered with. The writer has seen this scheme work very well indeed.

In conclusion it may be said that much of our mechanical drawing work is too "mechanical," too much along set lines and often devoid of good teaching technique and teaching devices. Let us remember that rules of pedagogical procedure govern this type of work as well as in teaching history or English. The drawings given herewith are intended to illustrate the points made and are not necessarily for "student consumption."

WOVEN FILET CROCHET

S. E. E. Hammond, Springfield, Mass.

WOVEN filet crochet, a combination of crochet and weaving, has its advantages over filet crochet in that different colors can be introduced in the working out of a design. At the same time it furnishes intensive, interesting practice in the practical art of darning.

The kinds of materials are varied, such as cotton, linen, and silk threads and flosses; yarns; cords of all kinds; and even raffia—the determining factor being the use to which the lace is to be applied.

The applications are unlimited. Some suggested uses are: bands, medallions, inserts, and pockets for dress trimmings; medallions and bands for hat trimmings; laces for curtains; belts and bags; inserts for towels and linens, either as markers or trimmings.

This work furnishes a great opportunity for original design. The design is first planned in one tone on squared paper using either soft pencil or crayon. (See illus.) The spotting as to dark and light is next considered. Then, the color scheme having been decided upon, the design is worked out in crayons or water color. The open design is more satisfactory for this kind of work.

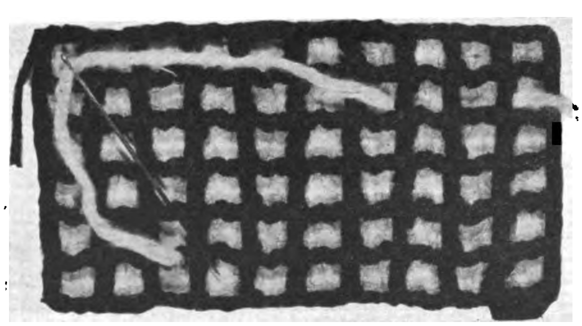


ILLUSTRATION 1. THE CROCHETED FOUNDATION.

Steps in Applying the Design.

Three steps are employed in making the woven filet crochet, viz: Making the crocheted foundation or net work, stretching and basting the foundation, and weaving in the colors.

Explanation of Crochet Terms.

Chain—(ch.)
Stitch—(st.)
Stitches—(sts.)
Double crochet—(d. c.)

Having loop on needle, throw the thread over the needle, insert the needle in the stitch, throw thread over the needle and draw thru the stitch, thus giving three loops on the needle; throw the thread over the needle and draw thru two loops; throw the thread over the needle and draw thru the two remaining loops, leaving one stitch on the needle.

Treble crochet (t c). Having loop on needle, throw the thread over the needle twice, insert the needle in the stitch; draw thread thru stitch; (there are now four loops on the needle); work off the loops by twos till one stitch remains on the needle. A space, a square, is formed by 2 d. c. with 1 st. between for fine net and 2 t. c. with 2 st., between for coarser net.

Crocheted Foundation.

The number of stitches in the foundation chain for the fine net is always determined by multiplying the number of squares in the width of the design by 2, adding 1 st., plus 4 sts. for the turn. For example, for a design 9 squares or spaces in width, multiply 2 times

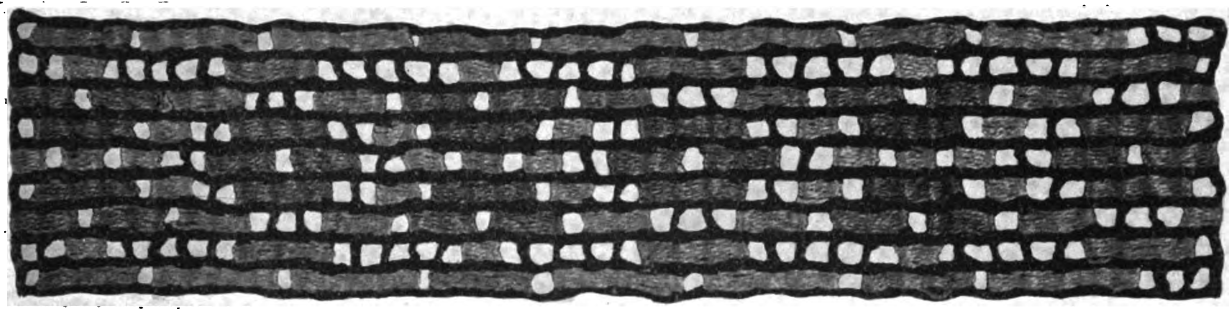
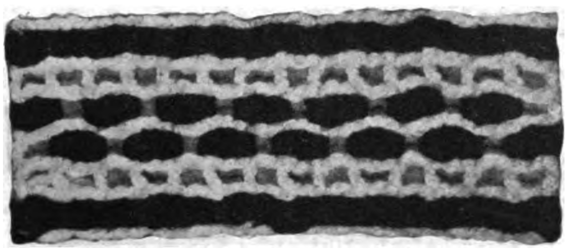


ILLUSTRATION 4



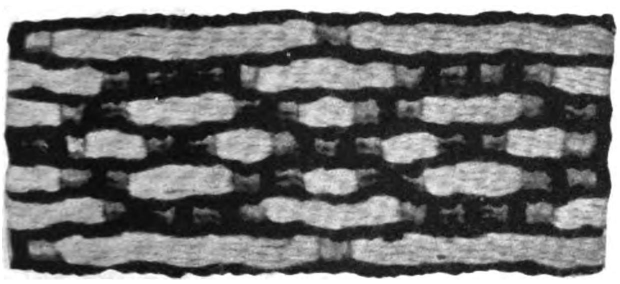
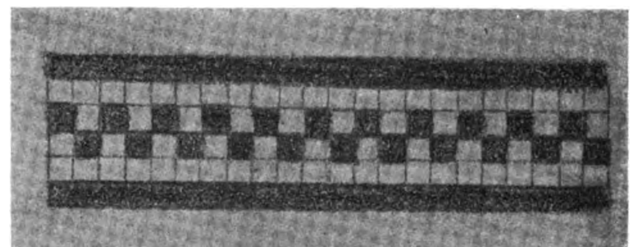


ILLUSTRATION 2 (Above).
ILLUSTRATION 3 (Below).



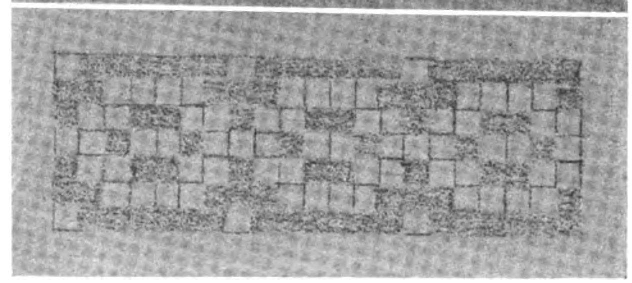


ILLUSTRATION 2A (Above).
ILLUSTRATION 3A (Below).

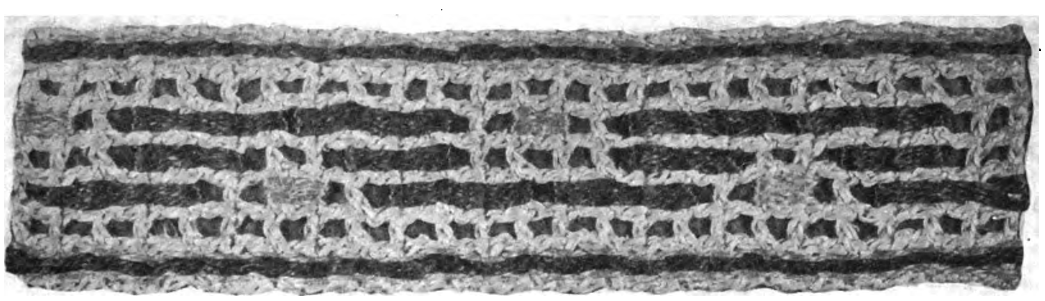


ILLUSTRATION 5

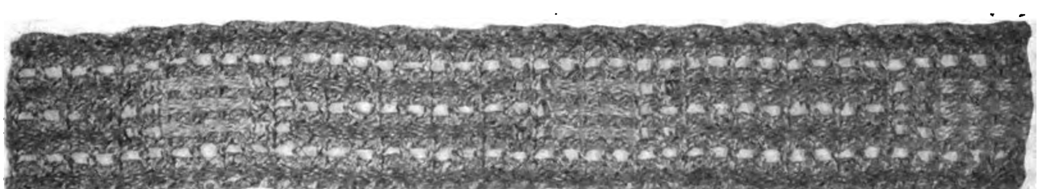


ILLUSTRATION 6

9, add 1, add 4 for turning, making in all a chain of 23 sts. The first space or square is made by joining the chain with a d. c. in the seventh stitch from the needle, the remaining spaces being made with 1 st. and 1 d. c. in the second chain stitch. Always take up two threads when inserting the needle in the previous row. A second row of squares is made by a chain of 4 to turn, joined with a d. c. in the top of the next d. c. of the previous row.

One should be very particular that these spaces are perfectly square as this is one of the important things required in the work.

For the coarser net the length of the foundation chain is determined by multiplying the number of squares in width by 3, plus 1 st., plus 5 sts., to turn. For example, a hat band 9 squares in width would require a chain 3 times 9, plus 1, plus 5 to turn, making in all 33 sts. The first square is made by joining with

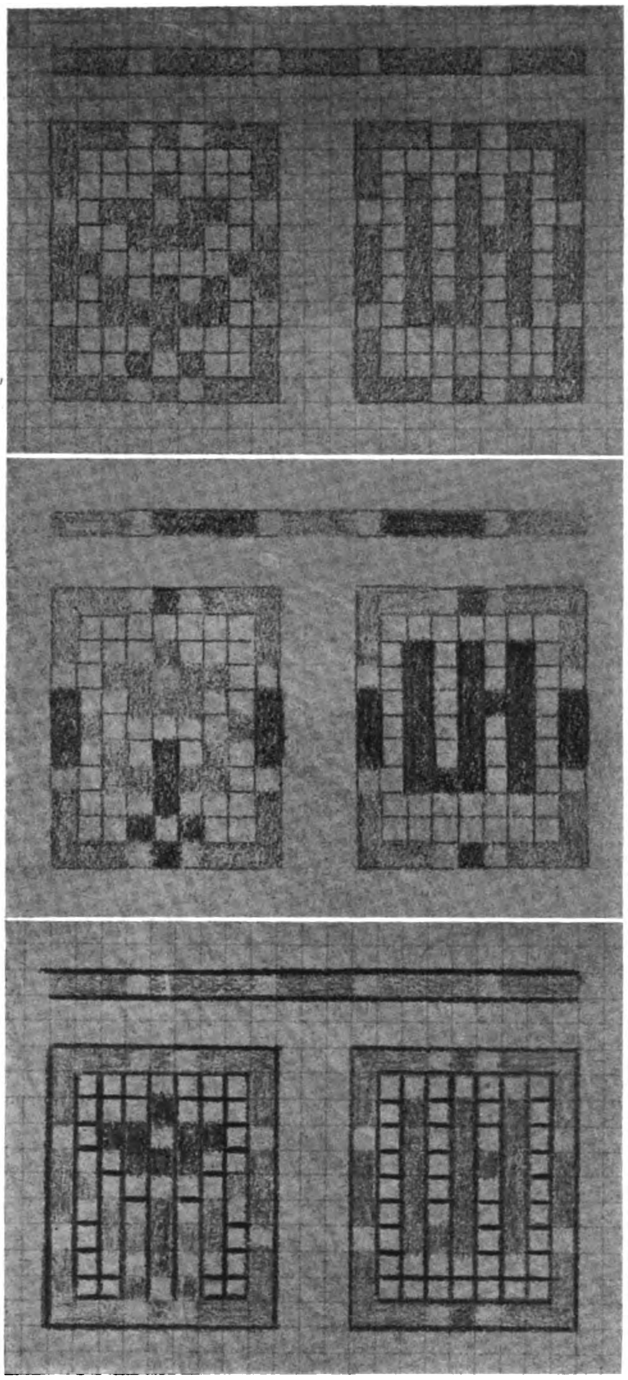


ILLUSTRATION 7A.
Left shows front of bag (Ill. 7) and right shows an alternate design.

the t. c. in the ninth stitch from the needle, the remaining squares being made with 2 ch. st. and 1 t. c. in each third chain stitch. A second row of squares is made with 5 ch. sts. to turn, joined with a t. c. in the top of the next t. c. of the previous row. Repeat the rows till the desired length is made. The loose crochet rather than the tight is the better adapted for this kind of work.

Stretching and Basting the Net Work.

From tag board, or light weight paste-board, cut a strip a little wider than the net and any desired length that will be easy to handle. Baste the *ends* and *edges* of the net or part of the net to this strip, being very careful to keep the width even and the spaces square. Use forty or fifty thread in basting so that the stitches will not interfere with the weaving. (Illus. 1.)

ILLUSTRATION 7.

The Weaving.

A long, slender darning needle will be found a good tool to use in this part of the work. Insert the needle-point between the net and board, one, two, or three squares back of where the spot of color is to be woven and push the needle thru the underside of the net to the square or squares to be filled in. (Illus. 1.) This is to hold the end of the weaving thread firmly and to do away with the use of knots. When weaving, insert the eye of the needle first, as this prevents splitting the threads of the net or of the woven color. Use the simple under-and-over weave when putting in the woven design. By a little careful planning, having many ends of the threads may be avoided by carrying the thread thru the under part of the net to the square or squares where another spot of the same tone or color is to be woven.

It is an important lesson to teach that the underside of the work should be as neat as the upper. Guard against pulling the thread too tightly in weaving. A loose and even tension is absolutely necessary in order that the lines of the netting may be kept straight. The woven spaces should be well filled so that the foundation color will not show thru. This will also bring out the woven design more clearly.

HANDWORK FOR INTERMEDIATE GRADES—I

C. Edward Newell, Director of Art and Handwork, Springfield, Mass.

The Airplane.

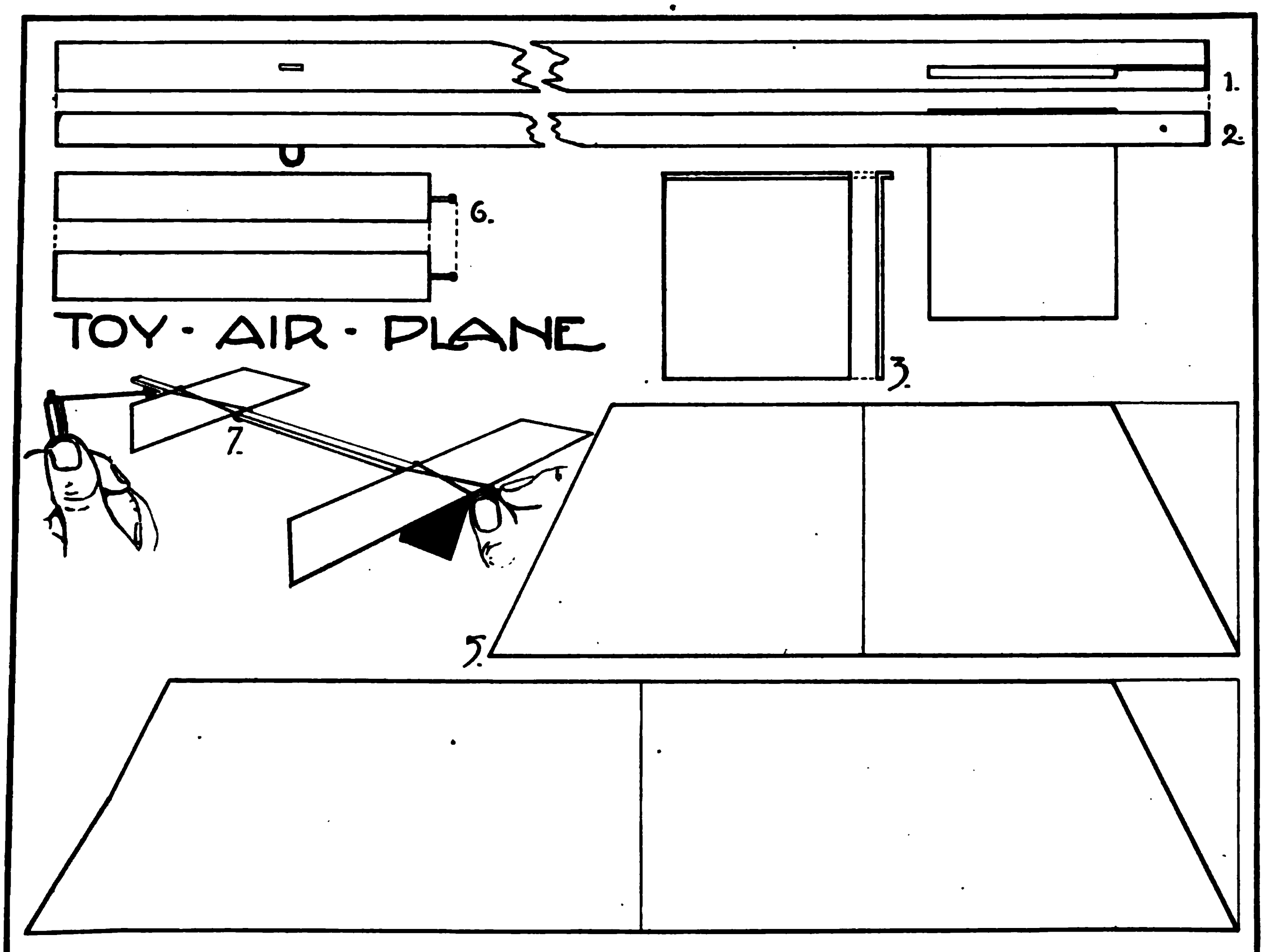
ARE not children vitally interested in transportation? Just ask them what they know about this subject from actual observation and you will be well entertained and possibly instructed by the lively recitals concerning the movement of trains, shifting of freights, passage of schooners, tugs and ferries. Most dramatic of all may be the stories about airplane maneuvers. How many boys and girls would prefer to make an airplane, one that will actually fly or will they prefer to make a "cord winder" a "window wedge" a "candle shade" assigned in some "prescribed" course of study? The vote will be an overwhelming majority, "a land slide" for the airplane.

Handwork for children of the present day must have a close association for their active not their passive interests. The projects must also possess a certain amount of the "play element." Discipline, accuracy in measures, good workmanship, pride in attainment never have to be commanded or demanded by instructors, neither do they have to be forced on the part of pupils when the aforesaid factors prevail.

A certain amount of dictation may have to be employed by instructors but this should be reduced to the least possible amount. We are sometimes justly criticised as being "too dictatorial" in our teaching. A real teacher will make a complete airplane, fly it across the playground or over the heads of the boys and girls in the room, then give the necessary instruction for the making and assembling of parts. By this method every boy and girl has a vision of the goal he or she will eventually reach. Rulers may be clattered with enthusiasm during construction but not with impatience. Points will be placed with very reasonable accuracy, not as the mere beginnings and endings for lines.

We hesitate to assign projects to any given grade or age since conditions vary so greatly in different localities, in public and private schools. The suggestions offered are for consideration by pupils below the sixth grade where shop or bench work is quite universally started.

The purposes and aims in these intermediate grades are to preserve the child's spontaneity and enthusiasm for drawing and building as a means of developing and



DETAILS OF TOY AIR PLANE.

expressing thought through form. Also as a means of developing judgment, sense of proportion, simple principles of balance, reasonable accuracy and skill in construction.

Since this period of a child's life is judgment forming rather than habit forming, it is quite essential that general education for all children should include some manual activities. Handwork provides an essential element in the education of the individual regardless of his future vocational interests. Accordingly this series of articles calls for the teaching of very simple basic principles of construction and the use of a few common tools. "We must discover the instincts, interests and capacities of pupils as they unfold in order that their art and handwork shall be of practical value and assert its educational value as a common means of expression."

The materials required for the construction of the toy airplane are as follows: one piece of soft wood 1/4" x 3/8" x 12"; one piece of manila tag stock 2" x 16"; one piece of thin iron or tin 1 1/2" x 1 3/4"; one wire blind staple 3/8"; one 3/8" No. 20 wire nail; one rubber band No. 10; two rubber bands No. 32; one piece of soft wood 3/8" x 3/8" x 3"; one 1" No. 18 wire brad.

The wood may be ordered from a mill or from a school shop in 3' or 4' lengths. These pieces can be cut to the required lengths in the classroom. The wood may be obtained from the clear stock, preferably pine to be found in packing boxes such as are used for baking powder and cocoa. The jute or manila tag should be of very heavy and stout quality, 250 lb. weight. Press board or glazed bristol may be used. The stock from light weight discarded suit boxes may be used if no better material is available. The iron or tin for the rudder may be No. 32 Tagger's iron or it may be stock cut from the sides of baking powder or condensed milk cans. The rubber bands must be of good quality, live rubber purchased by the ounce. Wire nails and brads are to be found at any hardware store.

In one end of the 1/4" x 3/8" x 12" wood cut a slit for the rudder 2 1/4" deep, Fig. 1. Slide one 1 1/2" edge of thin iron or tin into slit in wood and bend the iron at right angles 1/8" x 1 1/2", Figures 2 and 3. Slide rudder into slit as in Fig. 2 and drive one 3/8" nail thru wood to close slit and hold rudder in place. Drive one 3/8" wire blind staple into wood at point indicated in Figures 1 and 2, 2" from end of wood. The blind staple should first be placed over a No. 32 rubber band. Measure and cut the 2" x 16" jute tag stock into two pieces; one 2" x 10", one 2" x 6". Measure and draw the short diameter of each piece. Measure and place two points each 1" from the ends of the 10" piece on one 10" edge. Repeat the placing of points on one 6" edge of 6" piece. Draw lines from the points to the nearest opposite corners and cut on these four oblique lines, Figures 4 and 5. Place a No. 10 rubber band around the 1/4" x 3/8" stick inside of the rudder, lay the 2" x 8" x 10" jute tag on the wood, diameter over center opposite rudder, cross the band and slip the second end over the end of wood in which nail was driven. Repeat this exercise in order to fasten the 2" x 4" x 6" jute tag to the opposite end of the stick just over the 3/8" staple. The 4" and the 8" edges of jute tag wings are to be toward the front of the plane.

Drive a 1" No. 18 wire brad into one end of the 3/8" x 3/8" x 3" wood to make a sling handle, Fig. 6. Hold this sling in the left hand, place the No. 32 rubber band over the brad head in the top of the sling. With the thumb and forefinger of the right hand grasp the rear end of the 12" wood, draw this end back in order to stretch the rubber band, release quickly and the plane will readily "make off," Fig. 7.

SOME DETROIT BIRDHOUSES AND THEIR MAKERS.
Class of Mr. Frank I. Solar, Instructor of Elementary Manual Training, Detroit, Mich.

AN EVENING CLASS IN PATTERN DRAFTING, SHEET METAL TRADES SCHOOL, CINCINNATI, O.
Chelsea L. Bailey, Principal and Co-ordinator.

ENGLISH FOR THE WORKING BOY

Mrs. Blanche Dunn, Principal of Continuation School, Erie, Pa.

ALL lessons should begin with what is known. The aim should be to develop and to increase information and to develop habits of correct thinking and doing. Induce the pupil to "talk shop." At the same time teach him how to "talk shop" correctly.

John Jones exhibits the foot stool he has just finished in the shopwork half of his continuation day. "Sam Smith is making one too, but he's going to turn out a better job. He aint..."

"What!!! Isn't Mr. Aint dead, and buried, and over there on the wall isn't there a tombstone with the epitaph 'Keep him down'?"

"How is Ignatius Chapowick getting along with his stool?" "His footstool is all done but the skin."

"What? O, no, Ignatius. It was skin, but it is leather now."

"Leather? Not much. It's an imitation made of paper. And Ig. paid for it."

"Then it wasn't a square deal to be sold imitation leather for the real thing! Did he pay for real leather?"

"Whose fault is it if you are deceived? You have to pay for your own ignorance. Don't let people 'put it over on you.'"

"How could you say that in English?"

"And how can you prevent deception?"

"You don't know what deception means? Get out your dictionary. Well, how can you prevent it. Get busy.

Well, get busy. Go to work. Find out all you can about leather. Find out about imitation leather. Find out if Ignatius was cheated. If he thought it was leather and paid the price for leather, he was cheated. If he paid the price of imitation leather and didn't know it, he was deceived because of his own ignorance. He ought to know better."

If books with required information are available, this is the psychological moment for some intense research work.

"What can you find? Make notes. Present facts."

Interest aroused? Try it.

And after the lesson is over the teacher feels as if he had been holding down a volcano.

Result—Ig. paid for imitation leather. He had cheated himself because he didn't want to pay for real leather and didn't know the difference.

Next time....................

How do you spell shellac? Queer word, isn't it. Rather queer origin too. If you knew all about it you would not misspell it. What does it look like? What does it do to the wood? It really puts a shell over the wood.

Tell the story.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

CONTINUATION OR PART-TIME.

Some of the perplexities that are arising in connection with the newer phases of school work are due in considerable measure to a lack of uniformity in terminology. The term "continuation" as applied to certain schools and types of work has by virtue of tradition and association come to mean those schools and types of work which have later been designated as "part-time."

Thus under the Smith-Hughes law the work referred to as part-time work is the same work which for many years in Massachussetts and Wisconsin has been known as continuation work. But under the terminology commonly adopted in the state laws, especially in the west and middle-west, the term "continuation" has reference to a particular phase of the work carried on in a part-time school. This phase, or the "general continuation" work, is the same type of work that was earlier called "general improvement" courses.

Some have preferred to use the term "continuation" as the general term to include both the part-time and the evening school work. Since under the law the evening school work is trade extension in character, it would seem unnecessary to characterize it further. Since the part-time school recognizes three types of work, viz.: general continuation, trade extension, and trade preparatory, it would seem to us advisable to confine the use of the term "continuation" to the designation of that portion of the part-time school work which heretofore has been variously called "general continuation," "general improvement," etc. At least a common understanding should be arrived at so that discussions concerning the school work for employed minors may have a constant and accepted meaning to all.

SHOULD THE TEACHER PUNISH?

Our attention has been called recently to a repetition of the old issue between teachers and parents of a community with regard to the punishment of bad children in the schools. This is one of the questions that parent-teachers' associations are likely to discuss in any community, and there are conditions in the situation that seem to us not to have been sufficiently considered by the teacher.

Contrary to a persistent impression on the part of some parents and school authorities, teachers should not be expected to punish children for infractions of the rules. They are not trained nor employed for that purpose. The teacher is a leader and director of exercises to develop the character and mentality of children. The rules of conduct necessary to a school should be made clear by the teacher, but the administration of punishment is a responsibility which no thoughtful teacher will assume.

Citizens who take the law in their own hands are themselves breaking the law. The teacher who takes the law in his own hands is subject to discipline in most American communities. The citizen is not allowed to arm himself against the criminal, but must call upon the proper authority for redress. The best safeguard against crime, however, is certainty of immediate punishment. The school should be safeguarded against wilful infraction of rules by certainty of punishment.

We have seen capable teachers in the crowded schools of a large city confronted by pupils who defied the right of the teacher to "lay hands on them" because of a law against corporal punishment. The wise teacher will not assume police duties even under such provocation, but will make certain that authority is at hand to support him in the proper conduct of the school if he is to continue as a teacher in that school. No teacher with a proper conception of his profession will condescend to do police duty in connection with school instruction.

The athletic pedagog of the rural school, who reduced the bully of the community to submission, may have done a good job under adverse conditions, but he should be relieved of such a task under more civilized conditions.

There is but one reply to any zealous parent who makes dire threats against any teacher who lays hands on his progeny: "Have no fear that I will punish your child! I am not a policeman or jail-keeper, and if you need help of that sort, take your troubles to the principal, superintendent, or police."

Some of us recall the arm-pinching, ear-tweaking teacher who kept unruly members of the school under subjection. The recollection is not in favor of that teacher over others who kept us so busy and interested that we had no time or inclination for mischief.

No teacher who has done her duty thru the regular school period should be expected to keep the bad boy after school. This is perhaps an effective punishment for the boy, but the teacher who is obliged to remain after school hours with bad children should at least receive extra pay for extra service. The teacher should not be expected to punish children for any offense whatsoever.

WHERE THE MANUAL TRAINING TEACHER CAN HELP.

Frequently manual and industrial teachers express the regret that they are cut off from the work of the part-time school because of insufficient trade experience. There seems to be a rather widespread feeling that in order to have any connection with a part-time school the teacher must have had extensive trade experience.

It is generally true in the various states that teachers of shopwork are required to have considerable trade

training. However, there are other phases of the work that do not require trade experience. Teachers of non-vocational subjects, such as citizenship and hygiene, do not, of course, have to present qualifications in trade shopwork. Likewise, teachers of related English, mathematics, science, etc., are not held to the trade requirements, altho a sufficient contact with the trade and industrial world to make its terms and problems intelligible to them, is highly desirable.

Therefore, high grade manual and industrial arts teachers can render their best service to the part-time school in other capacities than that of shop teachers. Probably a very large percentage of the directors of part-time schools could not by any means qualify as teachers of shopwork, altho some contact with the trade and industrial world would be of great assistance to them.

The manual and industrial teachers should study the part-time school and the evening school problems and be ready to offer their assistance when the law takes full effect in the establishment of such schools. Teachers of these subjects are perhaps the best fitted, because of their experience and their point of view, of any teachers in the country to do the large share of the work which must be done in the name of the part-time and evening schools.

OBJECTIVES AND PUTTING THEM ACROSS.

A teacher who reads this magazine writes to us as follows: "A paper now and then on objectives in high school drawing would help me. I have had a wide experience as a practical mechanic and draftsman and have had a splendid technical training, but I find it difficult to pick out the essentials and put them across in a way that they will stick."

This is an interesting and significant request and we hope to be able to satisfy it. The statement is interesting and significant because it voices the state of mind of increasing numbers of teachers who are long on practical and technical training and short on pedagogical training and experience. This type of teacher is comparatively new in the schools but is increasing rapidly and promises to increase still more rapidly unless our facilities for training teachers can catch up with the demand for teachers. Standards on which objectives may be based have not been well established for instruction in the technical arts. Methods of putting objectives across are little better understood.

One conviction with regard to objectives in teaching is that the objective must represent the same definite purpose in the mind of the teacher and the pupil. Until the teacher and pupil agree upon a definite thing to be accomplished there is little hope of accomplishing much. One conclusion is reached with regard to methods of teaching. It is that the method must utilize in careful proportion, precept, example and practice according to the nature of the subject.

We hear from teachers of the trades in preparation for war that the average young man was taught a trade such as plumbing, bricklaying or rough carpentry in a few weeks by a little precept; good demonstration and persistent practice. The conditions under which this was done are not possible in the schools. The short periods of school instruction make it difficult to carry on a project that requires continued practice. With regard to instruction in drawing, the teacher is constantly baffled by the need of more time for the student to put on execution. Drill exercises in the use of instruments to give facility and accuracy have been reduced to a minimum or omitted entirely. Under the logical demand that a student should know what he is representing and at the same time gain facility and accuracy in the execution of the problem, courses in drawing have been formalized into a series of problems involving the objectives of both understanding and execution.

Perhaps the best method does not confuse these objectives in the same exercise. A finished, accurate drawing is the graphical statement of facts and conditions. Perhaps the method best adapted to school conditions is to consider drawing first as an aid in the study of a problem in geometry, mechanical construction or design; and finally as an exact statement of a problem that is understood.

This is the method employed in trade and professional work. The project is studied and formulated by sketches in pencil or some medium that may be changed readily. When the design is understood and verified, a careful, accurate drawing is made of it. To make the elaborate drawings of something that is not understood by the pupil may give some practice in the use of tools and mediums; but it will establish false pride and impressions and will not teach the essentials of drawing.

The method must accordingly vary with the objective. The objectives vary with the purpose of the course; if drawing in high school has a greater purpose than to give skill in handling instruments and mediums, then the objectives must include such an understanding of space relations, proportions, construction, composition, values, color, and so forth.

We have preached the doctrine of the hardship of work until we almost believe in it ourselves, and yet work gives to life all that there is to make life worth while. Work of itself has furnished to mankind more happiness than any other one thing. All work is not happiness, but life with no work would be unbearable. My idea of the real aristocrat, the man who can from within his own soul look down on others, is the master workman, no matter what his line of work may be. A job well done gives pleasure to the man who does it. There is happiness in the pride of being a master workman. There is happiness in the knowledge that one can work so well as to give a greater value in the work that is performed than is represented by the wage that is received.—*Henry L. Doherty.*

ART TEACHING AND THE ART INDUSTRIES*

Richard F. Bach, The Metropolitan Museum of Art

The story is told of a lady residing in one of our large cities that she chose a "one way" street on which to try out a new Ford; an officer noting her direction and speed stretched forth an arm of the law in a vain effort to stop the craft, shouting: "Don't you know this is a one way street?" From the car came a gasp but no reduction in speed and as the occupant struggled with suddenly stubborn controls the officer heard: "But I'm only going one way!" Had the feeling of the embryo chauffeur been consulted it might have been found that her sensations were, at that moment, those of going several ways at once.

The street of progress is a one way street. It may be said that in the industrial arts we are all going one way, but is it the same way, the right way, on the stately avenue toward better design? Like the victim of police regulations in our tale above, we are confused; not obtuse, not wilful, not selfish, not stupid—save the mark!—but surely unorganized. It remains for some wizard of crowd psychology—if a group of educators may be termed a crowd—to explode in our midst the bomb which will spur us all into activity, and activity of a productive kind.

We have trade schools, art schools, technical schools, vocational schools, industrial art schools, courses in applied design, in decorative design, in manual training, and a host of special schools dealing with these broader matters in relation to a single subject, such as costume design; and in addition practically all these things are being attacked here and there in our public schools, reached thru every manner of related teaching, such as applied science, geography, history, language, and—even instruction in drawing makes occasional contact with the principles of art!

All of these things are being done in so many ways that a graphic presentation of our united efforts would resemble the rapid readjustments on a kaleidoscope screen. And apart from the teaching method there is the curiously varied attitude of different schools, systems and individuals. Sometimes it is a slow grind with the objective of technical perfection; sometimes the impressionistic dash with the objective of *élan,* which is an excellent French word used by Americans to obscure poor execution by a smoke screen of unguided imagination. Rarely it is a resort to first principles, with a careful upbuilding of a structure that will be representative of us and yet be good. Again it is high seriousness—a sort of farce tragedy; or stolidity plodding too conservatively ever to stumble; or deftness that skims the surface touching only high spots and never sensing values.

No doubt there is need for all of these; for they are all human. Out of such variety as much uniformity as is really fundamental can with diligence and enthusiasm readily be constructed. They are all timely responses, and they unquestionably are all elements of the same chord. It is a matter of higher pedagogics to make them sound in harmony, to give them the same telling power and carrying quality (in spite of very poor acoustics) so that the objective of industrial usefulness may be achieved before the art industries finally decide that all the schools of art should be "scrapped."

To begin with let us make an odious comparison: fine art and industrial art. Do these words suggest comparison or contrast? Does their juxtaposition in the same line of type cause a revulsion in your mind?

Too often differences which are apparently the most outstanding, are those of degree only, not those represented in diametric opposites. So it is here. Fine arts and industrial arts are part of the same chain of reasoning; they require the same kind of thinking; they spring from the same roots; and what is more, those that we now call fine have always—until this sophisticated day—really been industrial. It is true that painters paint easel pictures that have no mural purpose, tho mural painting is the mother craft. It is also true that the painter uses no machines, tho his tools and pigments are made cheaper for him by the machine. But if the painter uses no machine it is only because the machine cannot do his thinking for him. On the other hand there are many other arts, metal, furniture, textiles, that do lend themselves in part to machine production without loss of artistic character. If the original design is good, the machine cannot hurt it. The use of poor materials or the abuse of the machine will not improve any design be it good or bad at the start; but here the industrial arts enjoy the same privilege as the arts called fine, for poor pigments will play havoc with the best subject.

The point, then, is that these classes of art, which are really of the same traditional stripe, lend themselves in differing degrees to the facilities of mechanical handling. When artists—and not teachers—lose sight of this fundamental unity of all the arts, they must perforce deny their own positions as designers.

What has encouraged this false attitude of looking down upon the industrial arts? It would be as wise a question to ask what has prompted us to look up to the fine arts. It is the machine, mass production. The machine has been the destroyer and at the same time the constructive genius of civilization. One invention after another has helped us gain speed or ease of production. And it was all so very easy that we forgot ourselves in contemplation of the splendid mechanism we had created. We expected it to do our bidding but never bade it aright. We fed it on the bread and water of design, and expected it to turn out the silks and lamps and tables and rings that would set by the ears the great styles for which Ghiberti, Cellini, Gouthiere and Boulle were the spokesmen.

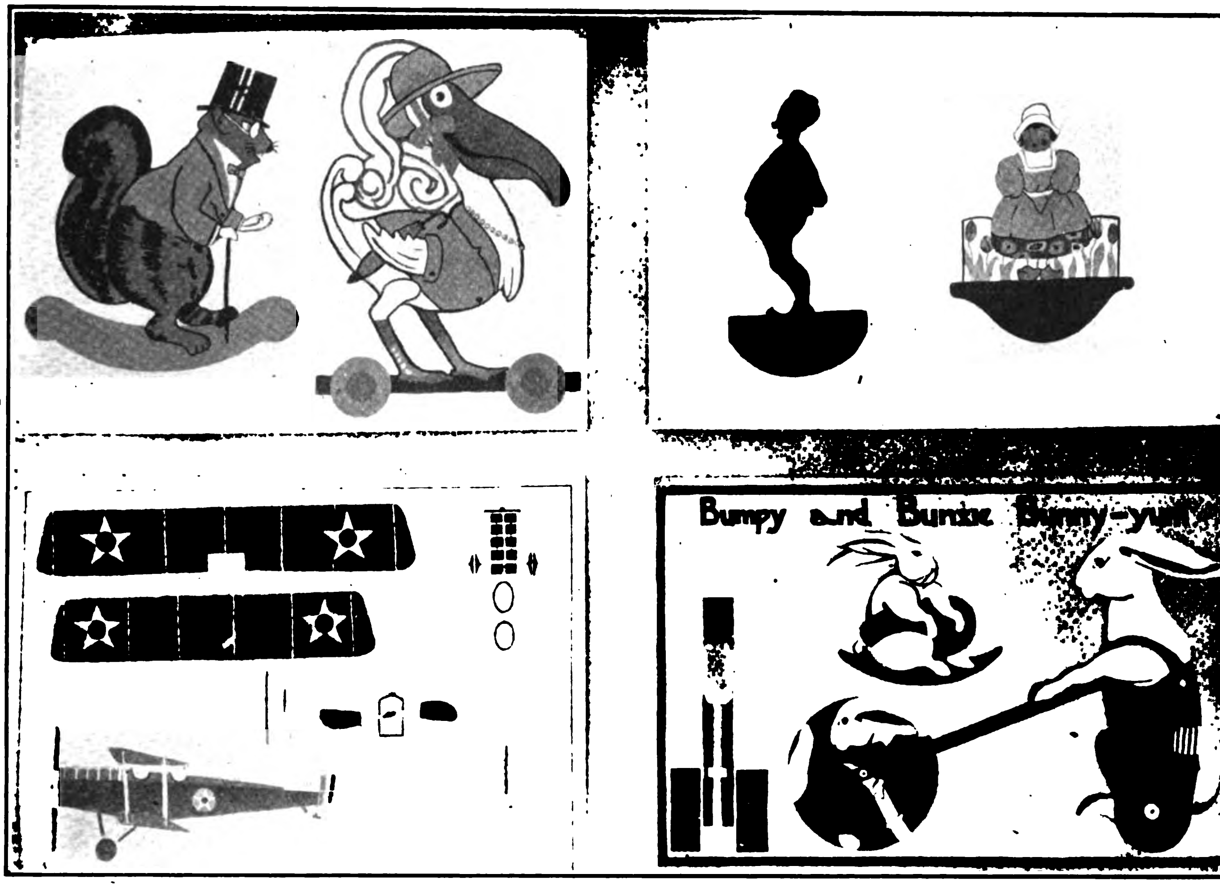
At the same time the call of the dollar, quickly made on the principle of rapid production and even more rapid distribution, also sounded loud and clear in the ears of American business men. The machine was the commercial agent and helpmeet and, being duly commanded, it did the work as directed. So we got designs quickly with more haste in cash return and less speed in progress of design. But the fault is ours, not the machine's.

To get a proper light on the whole matter of the machine we need only to follow thru from conception to completion any good piece of work in which complicated machinery plays a part. Such an inspection will promptly dispel any false notions as to the craftsmanship of present day work. The machine will stay and the craftsman of old also will stay (may his tribe increase); they will simply be doing two different things. And only one of these things will most of us be able to possess.

In any case, objects of industrial art are not bad because the machine had to do with their making; any more than objects of pure craftsmanship are good because the machine had nothing to do with their making.

You have all used a screw driver, and probably most of you have resorted to wearisome torsion of the wrist to make it do its work. Some of you may have seen a carpenter use a screw driver and wondered at his tool: he got his results by pressure and a ratchet device in the handle translated his pressure into the torsion that an ordinary screwdriver requires. Consequence: the man can drive six or eight screws in the time one demanded before. Was the improvement worth while? Could a craftsman legitimately use such a tool, granted that a craftsman may use machine-made metal screws at all? Yet this device has only a remote control over the design and does a kind of work that other tools and other things besides

*An address delivered at the Convention of the New York State Teachers' Association and affiliated organizations, held at Rochester, N. Y., Nov. 23, 1920.



SOME TOY DESIGNS MADE IN THE NEW YORK CITY HIGH SCHOOL CLASSES.
Courtesy Dr. James P. Haney.

screws could accomplish as well. But further: in large woodworking factories, the original torsion movement is operated by power, transmitted from a dynamo thru other mechanical contrivances to a flexible shaft at the end of which the screwdriver is fastened as a bit is fastened into a brace. Now the time of one screw is distributed, by help of a high mechanical development and the use of electricity, over scores of screws. Each such step reduces the time of labor, but makes no difference in the quality of either material or execution. Again it is a proper question: is the improvement worth while? Each such improvement brings the resultant piece of work within reach of a larger number of consumers. Thus we approximate the fundamental requirements of democratic living.

And the same sequence of steps could be shown in the lathe, the loom, the potter's wheel, the various power driven devices used in making silverware and jewelry. It is not the machine that destroys design. To blame it on the machine is to confess inability properly to use the machine. A mechanism cannot be reasoned with; it must be controlled ruthlessly. A mercerized cotton warp and a wood pulp filling will not produce in the journey thru the loom a pure silk fabric. A mediocre conception on paper combined with poor equipment inadequately understood will not produce a masterpiece in metal or in millinery. The answer is: workman, know thy tools.

So the primary requirement to bring art teaching to bear upon industrial demands is to know the tools of the trade we wish to reach. Imagination as an abstract quality of mind is a drug on the market; imagination as applied to a purpose, as an agency for conquering adverse conditions surrounding production, is the salvation of art of all kinds. Instead of courses in "applied design," we might think of them as courses in "applied imagination!" In the words "decorative arts," the first is an adjective, it qualifies. Yet most of the designs made in the schools, and the majority of those made by alleged professional designers, suggest—and indeed insist—that decoration, like imagination, can exist independently. If such were the case the theories of Einstein would be past history to the ordinary child of five, and mediums would need to discover new ethers in which to suspend their spirits.

On the other side we have, however, the spark which starts the whole conflagration, namely the genius of design, the ability to take infinite pains, and with it the knowledge of style, the control over the materials of drawing. Knowledge of the mechanical requirements of production will not make design; the experience of the last century has shown that all too well. Ability to design on paper is worth even less, for it will not give us even plain materials without decoration at all. Both must be the equipment of the designer, and in a sense—so far as trained discrimination goes—both should be the equipment of the producer himself.

We have laid design aside while as a nation we devoted ourselves to the machine. It is a new experience for humanity to conquer so many contrivances of quick production in so short a space of years. It is not remarkable that we have "fumbled" one line while trying our hands at another. But now that the machine is firmly fixed as a factor in our lives, let us use it to help assure production of always better designs.

Remedies are always of two kinds: immediate, to stop the bleeding as it were, and ultimate, to bring about the healing or cure. Thus we can attack our problem from two directions: as a prompt corrective we can teach the younger generation of designers those things which will make them understand the implements of production, and their work should be better for the added handicap else they will never be designers; as a final tonic we can reach the larger mass by teaching judgment, discrimination, appreciation to all. Thus we shall have a higher level for the mass, and the prospective designer has a better beginning, tho his path to glory will not be shorter for that.

A general opinion in favor of such a procedure means many things. It means that we must all be much wiser than we are at this minute. It means that we must all

keep on studying until we have taught our last class, and work harder for each class than we did for the one that preceded it. It means that aimless drawing must go, drawing which means only conquest of pencil and paper and ends there. It means that all drawing, tho the pupil may be planning to be a policeman, must have an objective of some kind, an objective in the form of application or of production in the round. If that cannot be done, the victim will be happier without drawing or perhaps should be turned loose in the carpenter shop or foundry. Drawing is not as fundamental a thing as we here are prone to think; most people have always and will always eat, sleep and be merry without knowing anything about it.

But more, we will have need of a new kind of teacher, a kind that does not exist now, a teacher of art appreciation. I mean a teacher who never writes art with a capital letter or comes to an art museum only to pray. I mean a teacher that can make this great language of all peoples intelligible to John Doe and Mrs. Brown and if necessary to every Tom Sawyer and Huck Finn in the land. That would be indeed a teacher (and special legislation at Albany would undoubtedly bring her a third of one per cent increase in salary).

The aim of it all is, briefly, to reach those who will design for production and those who will be the ultimate consumers of the objects produced. Yes, we shall always have dealers and distributors. They also must be trained. They also are going to be trained, and the process will be painful, for the public will not buy poor design,—I refer to the kind of public our scheme will produce. But there are signs of awakening among these dealers, who manufacture nothing but profit and are but middle men that handle art as they handle potatoes. There is no room to indicate here the manner of their awakening, but there is promise and hope for the future.

So we have the need for good design, and the adaptability of this to machine production; and we have the greater general knowledge among the public regarding art as a cultural investment. We could go on indefinitely and speak of the relation of good design in home environment to citizenship, home furnishings as a background for growing youth. It all comes to one thing: being alive to current issues. Art instructors—and legislators—and superintendents, I might add—have not been alive to current issues or else they would have seen in this mechanical development some clue for improvement of their own work.

What can be done, tho not in a school, may be seen at The Metropolitan Museum of Art. Here a department is maintained for the express use of manufacturers and designers, for many of whom it is second nature to draw inspiration from the collections. We have in New York an art museum that has gone into trade. Practically, that is what The Metropolitan Museum has done.. No amount of arching of eyebrows in select circles will avail; for as we live by trade, it behooves the museum to help trade improve the commodities it brings to us all. Manufacturers and designers now use the collections as sources of inspiration in their current designs; men's cravats inspired from armor, a lighting fixture from a Greek mirror, a lamp from a Sheraton chair, a mirror from a French ormolu furniture decoration, a talcum can from a Chinese vase, a gown from a painting, a soap wrapper from a snuff box.

That so many trades find their desired motives thus variously in all parts of the Museum shows that they consider the galleries but additions to their own facilities, a hopeful augury of progress for American home furnishings and industrial arts generally.

A staff officer of the Museum devotes his time to these many trades, about forty of them, reaching many firms directly and many more thru their representative trade journals which have manfully gone to work in the cause of American design.

Still further the Metropolitan Museum gains attention from salespeople and "buyers," engaged in shops and department stores. These attend the Study Hours for Practical Workers, the purpose of which is to add to their qualifications that sales idea which we in our distant manner call art. Design is a splendid "selling argument" if the salesperson knows how to place it properly in his brief for the piece he wants you to buy. In the presence of standard museum pieces, the merits and defects of objects out of current stock in the stores are discussed. First hand information results and the number of satisfied customers in the stores increases accordingly; as witness I quote only one example of the salesman whose newly gained knowledge of color combinations doubled his sales of feather fans.

All these are but practical suggestions from an allied educational institution but one withal that has seen the line of progress and has kept a steady course toward better design for American homes.

How much greater efforts can the school put forth; the general schools toward general appreciation of art as a cultural background, and the special schools as training centres for practical useful designers who know their tools, however complicated the course of production.

The trail toward progress is plainly blazed; there is but one way to go.

NOTE; Information as to the various types of educational and extension work maintained by The Metropolitan Museum of Art may be had by addressing Mr. Henry W. Kent, Secretary, The Metropolitan Museum, Fifth Avenue and 82nd Street, New York City.

A FORMIDABLE SHOWING OF BIRDHOUSES.
The results of the 1921 drive for birdhouses in one district school, the Essex Street Public School, Toronto, Canada.
A. J. Rostance, Esq., Instructor of Manual Training.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, *Milwaukee, Wis.*

SOME ELEMENTARY ELECTRICAL MODELS.

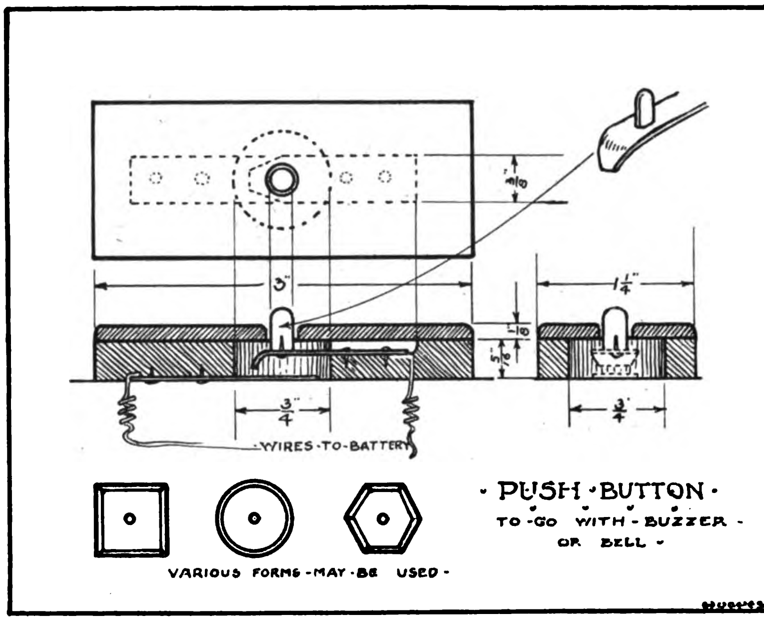
F. C. Hughes, Spokane, Wash.

The projects shown and described in this article combine work in both wood and metal and offer to the sixth and seventh grade boys some elementary electrical experiments that may be included in a series with other projects such as the motor shown in the May, 1920 number of the Industrial-Arts Magazine and others.

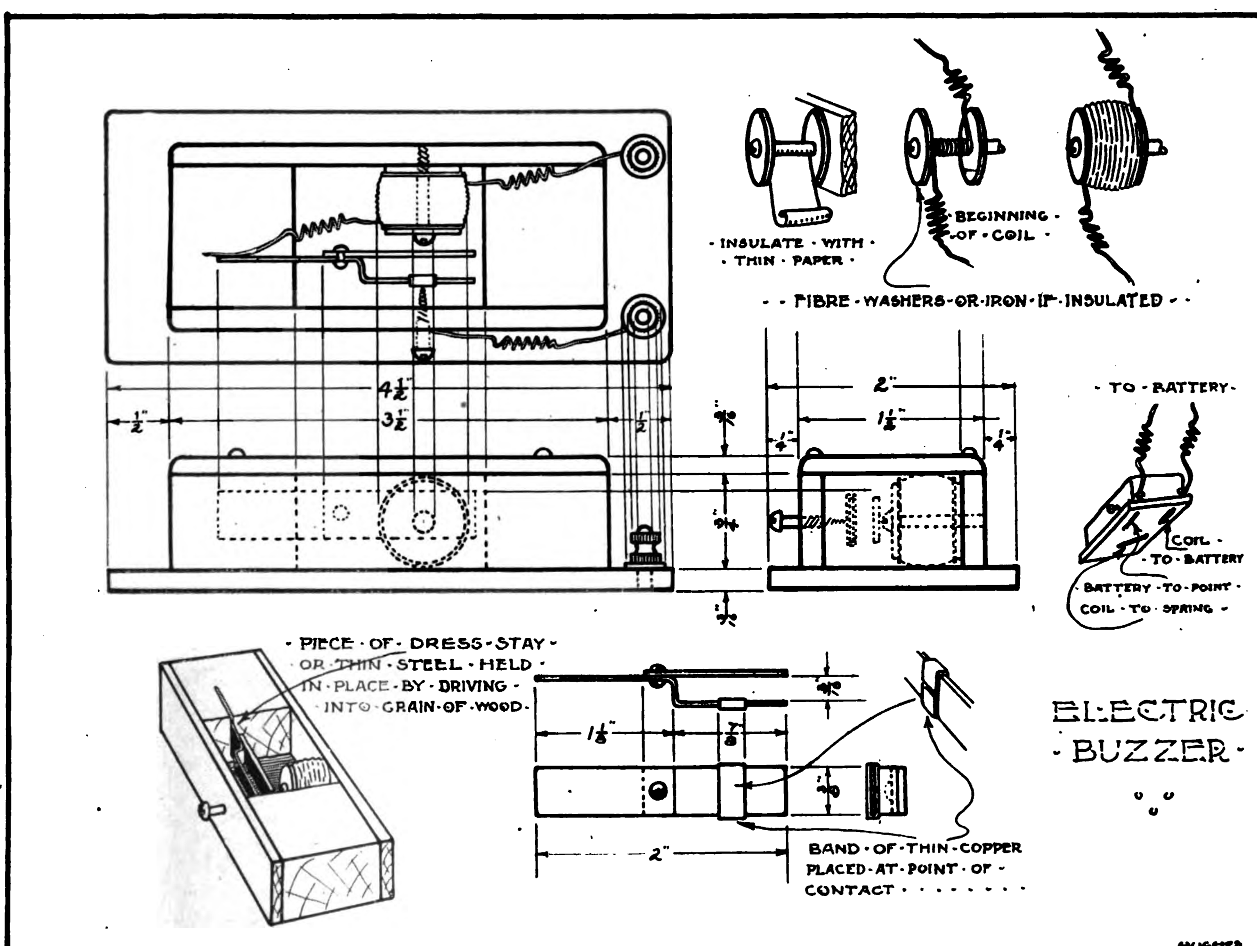
The Compass.

The compass in any form probably offers the simplest of all electrical experiments, giving to the boys as it does the principles of the magnet and the difference between the poles.

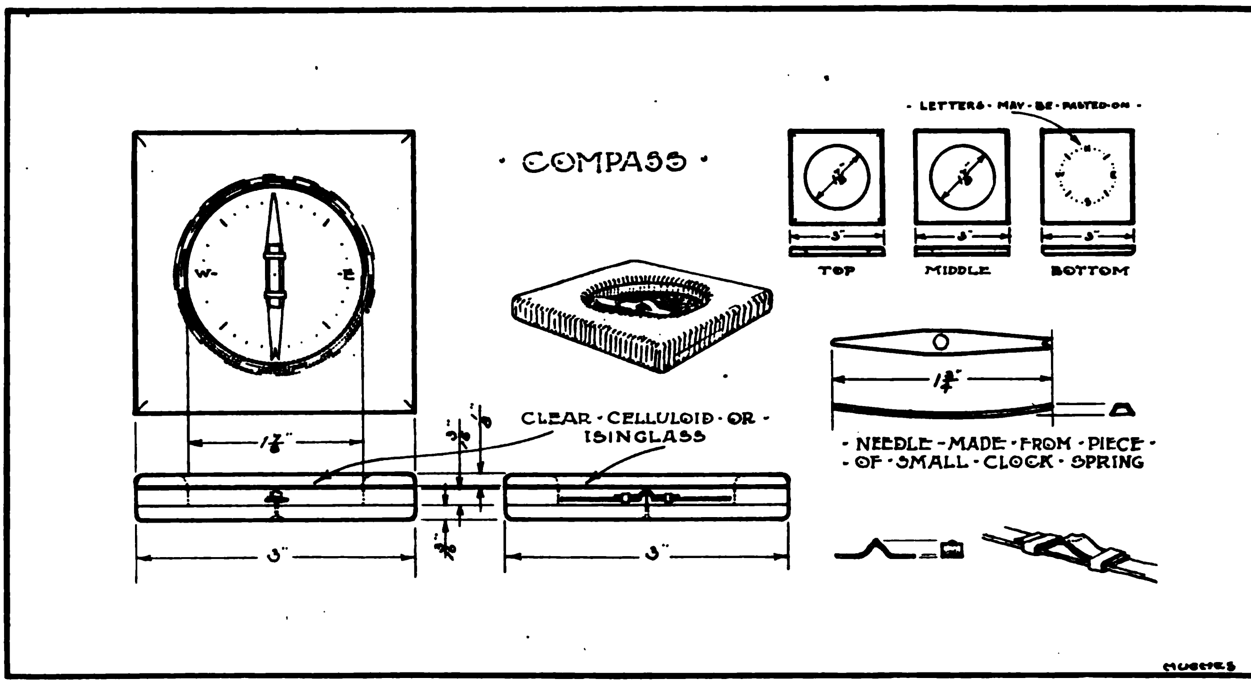
The body of this compass is made of three thin pieces of wood as shown in the drawing. Between the two top pieces is placed a piece of thin transparent celluloid which may be bought in large sheets and cut to size.



DETAIL OF PUSH BUTTON.



DETAIL OF BUZZER.



DETAIL OF BOYS' COMPASS.

The needle should be cut to shape and size from a piece of thin hard steel. The hole in the center should be about ⅛" in diameter. Magnetize the needle by drawing from end to end, across the poles of a horse-shoe magnet or those of an electric coil, and hang the needle as shown in the drawing, using thin metal for the hanger.

Hard steel must be used for this needle or it will not retain its magnetism.

The dial may be painted white, or a piece of white paper pasted on the wood. The outside may either be painted black or stained.

The Buzzer.

The electric bell or buzzer is a very simple project and one that all boys are interested in. The one shown here has been tried out in several large classes and has proven successful and practical in each case.

The coil should be made as shown in the drawing using a round head, iron screw for the core. Wind with about ten feet of about No. 18 cotton covered magnet wire.

The vibrator is made of a piece of very thin flexible steel such as a dress stay or watch spring. The drawing shows how this spring should be bent and riveted to the piece of soft iron. A band of thin brass or copper should be placed about the spring to keep the point of contact from burning a hole thru it.

Binding posts may be those taken from discarded dry cell batteries.

Push Button.

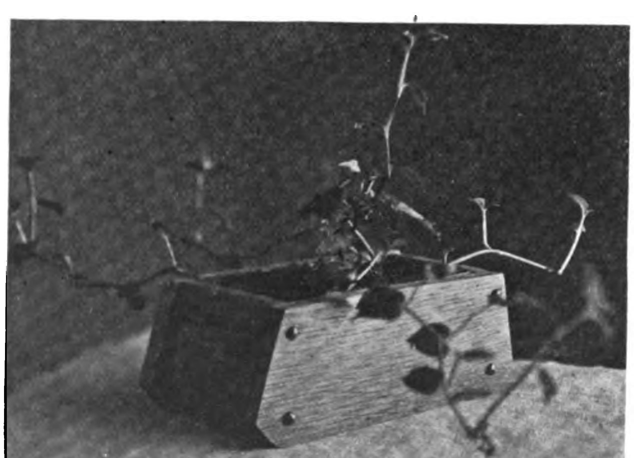
Along with the bell or buzzer should be the push button. This may be made as shown in the drawing but the form and shape may be changed in different ways to suit the pupil.

In wiring, the small wire used for the coil may be also used and connected up with the battery and buzzer so that when the button is pushed the circuit is closed.

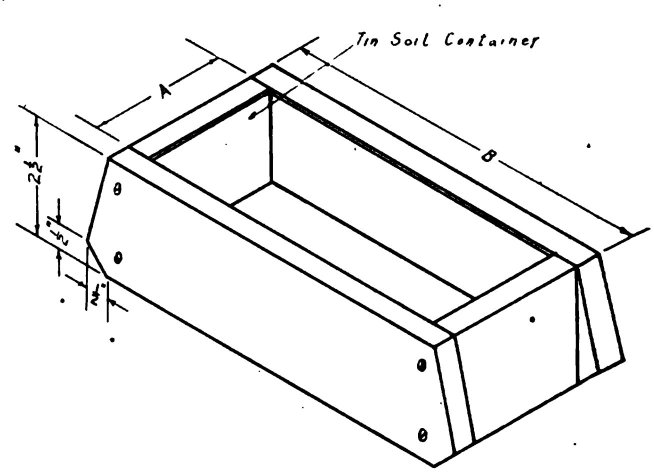
PLANT BOX.

R. W. Wagner, Webb, Ia.

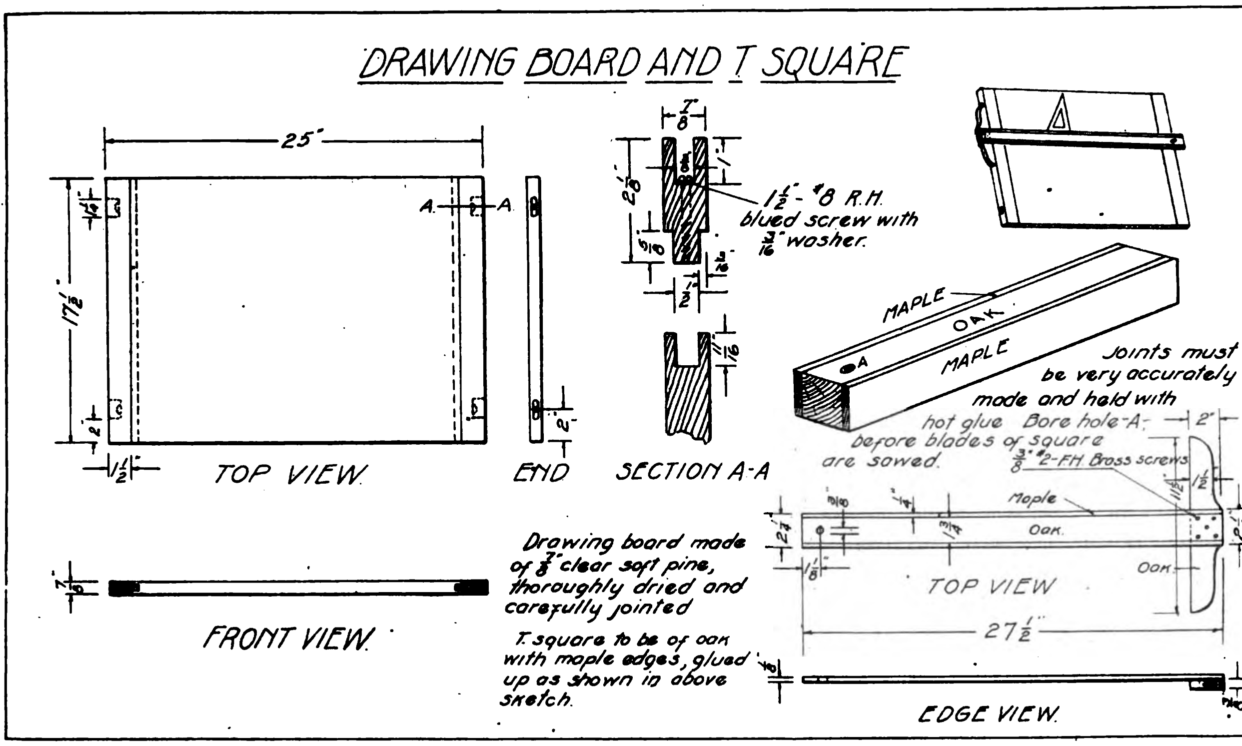
The utilizing of scraps is a problem ever present in the school shops. In making reading lamps (from Worst's "Problems in Woodwork") a large waste piece was cut from the center of each side of the shades. The accompanying figures illustrate a project devised to use up this scrap. The V shaped pieces were just the right size to make one side and one end of the box, and since it has no bottom, one lamp shade provided material enough for two boxes. A tin box, for soil, was secured inside the wooden frame. Making this tin box provided a simple exercise in sheet metal work.



PLANT BOX.



DETAIL OF PLANT BOX TO BE MADE OF SCRAPS.



DETAIL OF DRAWING BOARD AND T-SQUARE.

PROBLEMS ABOUT THE SCHOOL.

Leon H. Baxter, St. Johnsbury, Vt.

All of the following problems were made by our manual training department to comply with requests from various other departments of the school, and may be of assistance to those who might be asked to construct articles of a similar nature.

Study Table.

A suitable study table, where reference books may be kept, is quite an asset in the schoolroom. The type of table shown in the next drawing proved very popular and quite a number were made for various rooms.

The top was made up of ⅞" basswood, 3'-9" wide by 6'-9" long. The boards forming the top were planed to a careful joint and held by ½" dowels, four of them being equally spaced on each pair of boards, the holes being bored 1½" deep with a No. 8 bit.

The rough dimensions of the legs were 3½"x3½"x28⅛". Six inches from the top end the legs were planed so as to taper to 1¾" square at the bottom.

The two long rails were made ⅞"x5"x5'-11", and the end rails ⅞"x5"x36".

All rails had a tenon cut on the ends to the dimensions shown in detail. Mortises to match the tenons were cut at the top of the legs.

Four corner braces, ⅞"x4"x9" with ends cut at 45 degrees were made and holes bored and countersunk for screws.

Two strips 1"x1"x5'-6" and two 1"x1"x30" were cut and screw holes bored and countersunk, as shown in sketch. These were to be secured close to top edge of the rails and then screwed to the underside of the top itself.

All joinery was done with hot glue and all parts securely clamped overnight.

After the clamps were removed all extra glue was carefully chipped off and the top attached with 1½" No. 8 flat head screws. The corner braces were screwed on as indicated in the sketch.

It was then thoroly sanded and given a priming coat of paint. After this was thoroly dry, it was sanded with No. 0 sandpaper and a finish coat of desired color was applied. Gray is a very good color to use as it is neutral and shows the dirt and wear but slightly.

Music Stand.

At the request of the music supervisor, a number of adjustable music stands were made for various schools. The design shown in the next drawing was used and the stands have proven very successful.

The outside shaft is first made up of ⅜" oak, two pieces being 2¼"x36" and two 1½"x36". These were glued together with hot glue and securely clamped with eight wooden hand clamps so that the inside dimension was 1½" square.

The inside shaft is solid 1⅜" square by 29" long. The top is rounded and a slot cut at the top ⅜" wide and 1¾" deep. A hole is bored from side to side ⅜" in diameter and ¾" from the top.

Strips of oak ¼" thick by ½" wide are cut and mitered at 45 degrees to fit on top of the outside shaft and are held with glue and ½" brads.

The sub-base is ⅞"x4½"x4½" and is held to outside shaft with glue and 1¼" flat head screws. The location of the screw holes is shown in the drawing of the sub-base.

The base is ⅞"x10"x10" and is held to sub-base by 1¼" screws put in from the under side at places shown in drawing.

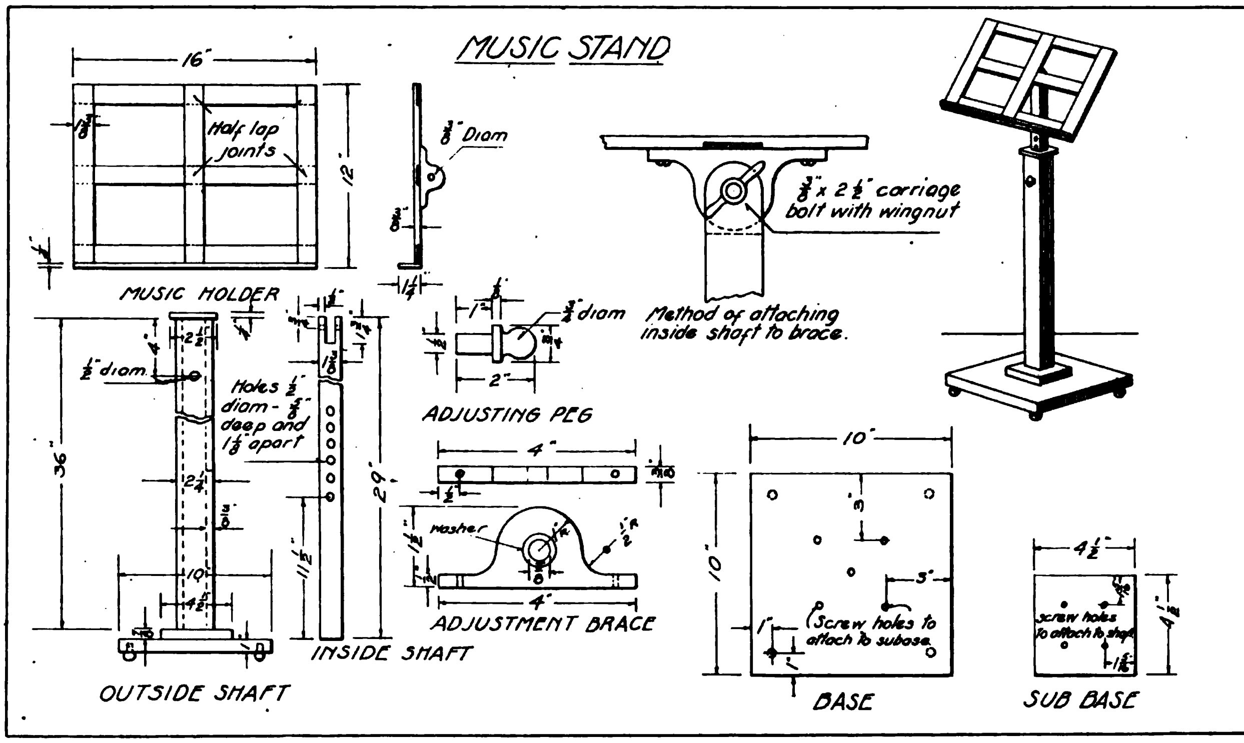
Four turned pieces for the legs are made on the lathe, similar to the drawing of the adjusting peg, with the exception that the dowel piece that enters the base should be ⅝" for the legs instead of 1".

Make the adjusting peg next, to size shown, and bore the hole to receive same in the outside shaft with No. 8 bit, 4" down from the top.

The music holder is made up of ⅜" oak in strips 1⅜" wide. Three pieces are made 12" long and three 16" long and all joints are half-lap as indicated. A strip ¼"x1¼"x16" is made and attached to the bottom edge of the holder by means of glue and ¾" brads. All joints are held with hot glue and securely clamped.

The brace is made up ⅜"x1½"x4" and cut to shape shown in detail. A ⅜" hole is bored 1" from the rounded edge, in the center, and two small holes for screws ½" from the ends. This is glued and screwed to the middle slat of the holder with ¾" round head blue screws.

The holder is held to the inner shaft by means of a ⅜"x2½" carriage bolt with a washer and wing nut as shown.



DETAIL OF MUSIC STAND.

Holes are bored with a No. 8 bit, $\frac{5}{8}$" deep and 1$\frac{1}{8}$" apart on centers, starting 11$\frac{1}{2}$" from the bottom of shaft. These engage with the adjusting peg to raise or lower to desired height.

All parts are sanded absolutely smooth and stained with Johnson Wood Dye, No. 125 Mission. Three successive coats of shellac are applied on different days, the first two being rubbed down when dry with No. 00 sandpaper and the last coat with ground pumice and oil.

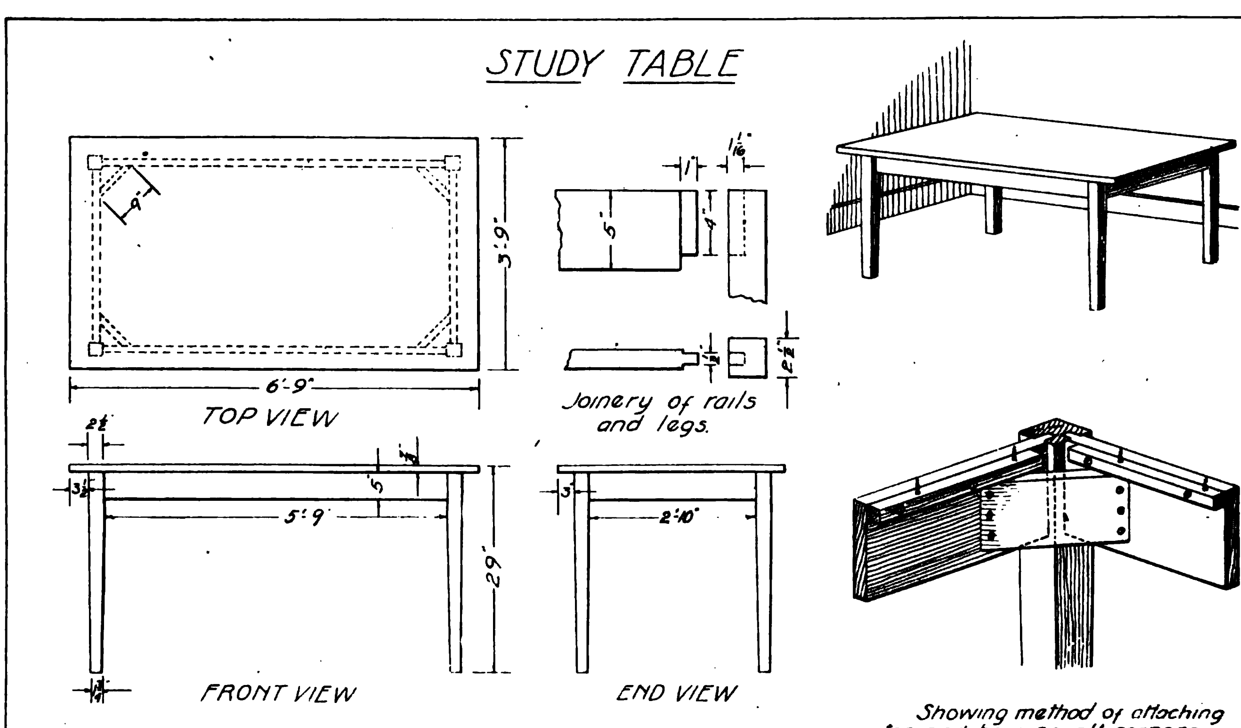
Drawing Board and T Square.

About three dozen drawing boards and T squares were made for use in the Junior High School drafting room and formed a most interesting and worth while problem.

The main part of the drawing boards was made $\frac{7}{8}$"x17$\frac{1}{2}$"x22". Soft pine is the best material to use and the pieces should be carefully jointed and doweled together with $\frac{1}{2}$" wide dowels, the holes being bored with a No. 8 bit, 1" deep, and each pair of boards used in the construction should be joined with three dowels evenly spaced.

The strips, or cleats, $\frac{7}{8}$"x1$\frac{1}{2}$"x17$\frac{1}{2}$", are made for reinforcing the boards at the ends.

Slots are bored with a No. 6 bit, 1" deep and 1$\frac{1}{4}$" long as shown on the drawing. These are 2" from the ends of the cleats. A shoulder is cut in the edge of each cleat on one side, $\frac{5}{8}$" high and $\frac{1}{2}$" wide. This fits into a corresponding groove cut in the ends of the drawing



DETAIL OF TABLE FOR STUDY PURPOSES.

board. These grooves are 11/16" deep and ½" wide. The extra sixteenth in the depth of the groove over the height of the shoulder or tenon is to allow for shrinkage or swelling.

Round head blue screws, 1½" No. 8 are set in the slots for the cleats previously bored, slipping them thru a 3/16" washer.

No glue is used in attaching the cleats as after being fitted into the groove, iron clamps are put on and while thus clamped the screws are firmly set in. The idea is to allow for shrinkage and expansion in the board which is taken care of by the slot and shoulder.

The surfaces are carefully sanded, first with No. 1 and afterward No. 00 sandpaper. The edges are all made square and true.

The squares are first built up of oak with maple edges. A piece of oak 1¾" thick and 4" wide is squared up and pieces of ½" maple 4" wide is glued to the oak on its 4" sides with hot glue only. The pieces are 27½" long. At least ten wooden clamps should be used in clamping these up and care should be taken to see that there is an even pressure thruout. The hole shown in the drawing, by which the squares are hung up, are now bored, using a No. 6 bit and locating the same in the center of the square 1½" from the end.

Plane the top surface smooth, and if possible, run the stock thru a circular saw to a thickness of 3/16". These blades are next planed on both surfaces so that the finished piece is ⅛" thick.

The maple edges must be planed absolutely straight and square. Locate five holes in the end of the square to receive the screws for attaching to the head. These are countersunk.

The head of the square is ⅜"x2"x11½" and made of oak. The heads are shaped with a freehand curve, balancing on each side, as shown in the drawing.

These are attached to the blade by ⅜" No. 2 flat head brass screws. Considerable care must be taken to get the blade and edge of square at exactly right angles, or 90 degrees, with each other.

The squares should next be oiled with linseed oil rubbed in, and after drying 24 hours, two successive coats of shellac (white) applied, the first being rubbed down with No. 0 sandpaper and the last with ground pumice stone and oil.

ADJUSTABLE BAG-HOLDER.

Robert H. Smith, State School of Agriculture, Canton, New York.

The use of grain as feed is universal on farms whether poultry farming, dairy farming or general purpose farming is carried on. In feeding it is seldom used as bought but is mixed to form the ration in use and after this mixing process it is rebagged in order that it may be more conveniently handled. This makes the bag holder shown an interesting project for the farm boy—it has a place and utility on the farm. In addition to the interest created it has many other features that make it good as a shop exercise.

1. While not too difficult its construction involves the use of, and gives practice in handling, a number of tools common to the farm shop.
2. It readily adapts itself to construction by a group of boys or by a single student who wishes it for use on the home farm.
3. Its construction does not call for the use of expensive materials as it can be largely made from small pieces that might otherwise be thrown away.
4. While made adjustable in both height and width enabling it to care for any size sack, the same principle may be used and the work simplified by making it non-adjustable.

Material List.

Lumber.

No. Pieces Required.	Finished Size.	Where Used and Drawing No.
2	1 foot 3" x 2¾" x 1¾"	Sills numbers 4 and 7.
2	1 foot 6" x 7¼" x 13/16"	Floor boards No. 8.
2	4 feet 0" x 6" x ½"	Uprights No. 9.
2	6" x 1½" x 13/16" (hardwood)	Cross pieces at base of uprights No. 10.
2	5⅛" x 1½" x 13/16"	Cross pieces near center of uprights No. 11.
1	6" x 1½" x 13/16"	Cross piece on extension bar No. 12.
1	1 foot 6" x 6" x 13/16"	Extension bar No. 2.
1	6" x 1¾" x 1¾"	Support for right hand upright No. 13.
2	1 foot 2½" x 13/16" x 13/16"	Guides for extension bar No. 1.
2	5½" x 3" x 1⅞" (maple or birch)	Guides for holding jaws No. 6.
2	9" x 3¼" x 1¾"	Holding jaws No. 5.

Hardware.

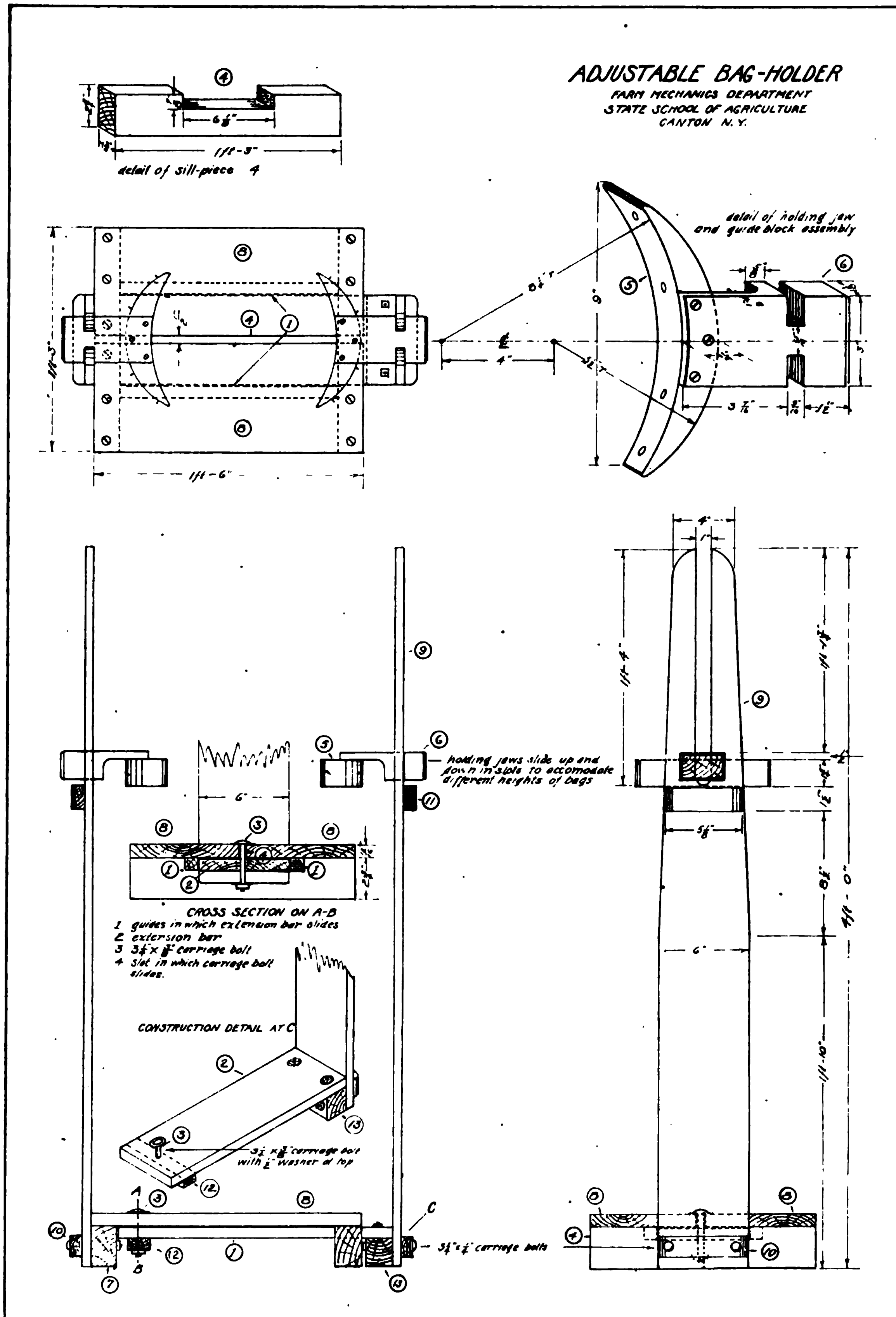
10	2"—No. 10 F. H. B. screws for base.
12	1"—No. 7 F. H. B. screws for holding jaws assembly No. 5 and No. 6 and upright center cross piece No. 11.
4	3¼" x ¼" carriage bolts with washers for bolting uprights to base.
2	2¾" x ¼" carriage bolts for joining support block No. 13 to extension slide No. 2.
1	3" x ⅜" carriage bolt with ½" washer beneath head and ⅜" washer for threaded end for left hand end of extension board No. 2 to slide in slot No. 4.
	Small quantity of 3D and 6D nails.
	½ pint of floor oil or paint oil.

Construction and Assembly.

1. Select a springy, straight-grained piece of ½" material that will dress 6" wide and cut from it a piece 4'-1" long from which to make upright No. 9. The extra inch is left for squaring after the edges are jointed.
2. Joint the edges making the piece just 6" wide.
3. Square one end, removing but a small amount of wood. Test for accuracy. If inaccurate, square again and re-cut.
4. From this finished end measure off 1'-10" and square a second line across the piece. The extremities of this line locate the points where the taper starts for the upper end of the upright.
5. At a point 2'-8" from the finished end, square a second line across locating the upper edge of the center cross piece No. 11.
6. Measure 4'-0" from the finished end, and square a third line across the piece locating the top of the upright.
7. Gauge a center line down the top of the upright and with a center located in this line and a radius of 2" describe a circle touching the line squared across the top.

(Note): Top may be finished with obtuse angle if desired instead of circle.

8. From the extremities of the second line squared across the upright, draw straight lines tangent to the circle described at the top. This gives the desired slant for the taper.
9. At a distance of 2'-8½" from the finished end, locate a point in the center line just made. This is to serve as a center for an inch hole which forms the base of the slot in the upright.
10. Gauge lines 1" apart and equally spaced on either side of the center line from the point just located to the top.
11. Bore 1" hole at the point indicated, cut curve at the top of upright with compass saw and cut outside taper and sides of the slot with rip saw. Finish outside edges smooth with plane and spoke shave. Inside edges may be smoothed with wood rasp.
12. Construct second upright same as one just made.
13. Select a piece of 13/16" pine or basswood and make two center cross pieces 5⅛" long and 1½" wide with corners rounded as indicated on drawing No. 11.
14. By means of 1" screws driven from the inside fasten these pieces squarely across the upright at the base of the slot in the upper end at the point previously located.



DETAILS OF BAG HOLDER FOR FARM USE.

15. From a piece of 13/16" hardwood make two bottom clamps No. 10, 6" long by 1½" wide and with rounded corners as shown.

16. From elm or other tough wood cut a block 1¾" x 1¾" square and 6" long. This is shown as number 13 in the construction detail of joint "C" and serves as a foundation for the right hand upright.

17. Construct the extension board from 13/16" lumber 1'-6" long by 6" wide. This is shown as piece No. 2 in construction detail at "C". Make and nail the strengthening cleat No. 12 across the inner end of the extension board as shown. Bore ⅜" hole for carriage bolt No. 3.

18. Assemble right hand upright and extension

CHART SHOWING STUDENTS AND TIME THEY ARE RESPONSIBLE FOR THE DUTIES CONNECTED WITH SHOP WORK COURSES

WEEK ENDING	TOOL ROOM	FINISHING ROOM	CHECKING BENCH EQU.	CLAMPS-GLUE SCRAP LUMBER	SURFACER	JOINTER	CIR-SAW	BAND SAW	MORTISER	SANDER	REPAIR WORK	SPECIAL

AN ORGANIZATION CHART WHICH IS HELPFUL.

board as shown in construction detail using ¼" carriage bolts with washers beneath nuts.

19. Cut two pieces 1'-3" long by 2¾" wide by 1¾" thick for sills, numbers 7 and 4. Sill No. 7 for left end is left in this shape. Sill No. 4 for right end has gain cut in upper surface as shown in detail of No. 4.

20. Dress two pieces of 13/16" material, 1'-6" long by 7¼" wide with squared ends to serve as floor boards, No. 8.

21. Fasten floor boards to left hand sill No. 7, with 2" No. 10 F. H. B. screws leaving a ½" slot in the center.

22. Place right hand assembly of upright and extension board in position and fasten right hand sill No. 4 in place using 4-2" No. 10 F. H. B. screws.

23. Place ⅜" carriage bolt thru slot in floor and hole in extension board. Bolt No. 3 should have ½" washer at the top and ⅜" washer at the bottom.

24. Cut two pieces of 13/16" square material of the proper length to reach from sill to sill beneath the floor boards. These are to serve as guides No. 1. Nail them in place on either side of the extension board. Extension board should now slide freely in and out. If it does not adjust until this condition is secured.

25. Bolt left-hand upright in position using ¼" carriage bolts with washers.

26. From cardboard, stiff paper or tin construct a template for cutting out the holding jaws, using centers and distances as given on the detail of No. 5.

27. Place this template on a piece of tough straight grained material, 1¾" thick with the grain running lengthwise of the template and mark around the template laying out the form of the jaw on the wood. (Note): If desired these jaws may be made from a piece of straight 13/16" material. This simplifies the work but does not give as good an appearance as the curved jaw does.

28. Cut these jaws to shape. This can best be done by making saw kerfs at right angles to the edge of the piece and extending down to the curved outline of the jaw, the saw kerfs being about ¾" apart. The waste wood is then removed with a chisel and the piece smoothed up with the spoke shave. Nails are put thru from the inside as indicated and filed sharp to provide hooks for holding the bag.

29. On a piece of hardwood, maple or birch, 1⅞" thick by 3" wide lay out the mortises as shown in the detail No. 6. The curve on the under side of this piece may be constructed in the manner outlined for the jaw or an inch hole may be bored thru at the proper point and the horizontal and vertical saw cuts connected into it. If the hole is used it should be laid out and bored from both sides, the work being afterward smoothed in the curve with the rasp.

30. Attach guides No. 6 to jaws No. 5 with 1" No. 7 F. H. B. screws. They should work freely in the slots of the uprights.

31. Holes may be bored in the upright and a pin attached to a string provided on each side for holding the jaws at the proper height to accommodate the bag in use if desired. This was done on the first one constructed and found unnecessary, the tension of the uprights pulling against the open mouth of the sack being sufficient to keep the jaws from slipping down.

32. The device should be given several coats of floor oil or linseed oil and turpentine. This will tend to prevent shrinking and swelling.

Operation.

In use the uprights are pulled apart to the proper distance to take the sack being used. The tops are then sprung together and the top of the bag placed over the holding jaws. These are then permitted to spring apart holding the mouth of the sack open. The holding jaws are then moved up the uprights to the proper height.

AN EFFECTIVE DUTY CHART.

C. V. Denman, San Marcos, Texas.

Is your shop properly organized? Are you getting the greatest amount of efficiency for the least amount of effort? These are some of the questions we should ask ourselves as teachers of shop courses. Perhaps you may be overworking some willing student while another may not be getting all the training he should be receiving.

The charts accompanying this article may seem simple but it is often true that the simple things are the ones which work best and we are least apt to think of. The writer has found charts 1 and 2 especially helpful because it places a definite responsibility upon a definite student. Students are usually willing to carry out a reasonable assignment when they know definitely what that assignment is, and seeing their names on a chart impresses the fact upon them that they are being held responsible.

Many shops practice the plan of having the last operator at a machine take time to brush it clean. With this plan there is no definite method of checking, the necessary duties may be performed and again they may be left for the instructor to perform.

The blank squares on the large duty chart are 1"x1¼", sufficiently large to enter the name of a student from each class reporting to the shop. The oiling chart may seem to some to be in part a duplicate of the general duty chart but it can hardly be dispensed with. Anyone adopting these charts will probably need to change them somewhat to meet local conditions but such a system is convenient and will repay you many times for the trouble of working up tracings for prints.

THE ATLANTIC CITY CONVENTION.

That vocational education is still in the promotional stage and that its problems are still so new that theories as well as practice are changing with great rapidity, was evidenced at the Atlantic City meeting of the National Society for Vocational Education. The program prepared by Mr. Wm. J. Bogan of Chicago, approached the subject of vocational schools from the practical standpoint of the administrator who is engaged in introducing the work into the several states and local communities. The meetings were well attended and the enrollment was slightly larger than it has been in previous years. On the second and third days there were present many superintendents of schools who came in advance of the meeting of the Department of Superintendence.

The first day was devoted entirely to problems arising in the part-time or continuation school. It was made very plain that for the present, the continuation school must provide opportunities for review and drill in fundamental subjects, and for advanced work for those pupils who have received a grounding that will permit them to apply these subjects to the experiences of life. The schools must help the children to analyze their present jobs and the jobs which they will undertake later in life. The schools must be the place of vocational counsel and guidance and they must provide rich opportunities for prevocational shop experience. To make the child efficient in his present temporary job is important, but it is of far greater importance to prepare him for the job which will be the permanent lifework.

The speakers of the day included Mr. W. A. O'Leary who spoke on "Vocational Efficiency in Industry As Resulting from the Part-Time School," and Mr. O. D. Evans who took up the specific functions and organization of urban continuation schools. The specific problems of developing units of instruction and short courses were handled by Mr. Oakley Furney of New York City, and suggestions for making the instruction of permanent vocational value were given by Mr. E. A. Wreidt of Indiana.

The sectional meetings in the afternoon took up the agricultural, commercial, industrial and home making aspects of the subject. The problems of training foremen were discussed at length by Mr. Arthur L. Mann of the Eastman Kodak Company and by Mr. James Cronin of the Pennsylvania Department of Labor. A reception was given on Thursday evening at which Mr. James P. Munroe, Vice-Chairman of the Federal Board for Vocational Education, acted as presiding officer.

Vocational rehabilitation formed the topic for the sessions on Friday. The great success of the rehabilitation work with disabled soldiers has become the inspiration for similar work in a number of states. The federal aspect of the subject was developed by Mr. Lewis H. Carris, of the Federal Board for Vocational Education. Pennsylvania's experience showing that 1290 persons had been offered help was presented by Mr. S. S. Riddle of the Bureau of Rehabilitation for Pennsylvania. Mr. Riddle's paper indicated that 148 of those injured could not read or write English, that the bureau helped 190 to get appliances enabling them to return to work, that 80 are under training at the present time in short courses, and that 67 are receiving maintenance not exceeding $15 a week during training.

Individual attention to cases is the fundamental of success according to Mr. O. M. Sullivan, State Director for Reeducation of Injured Persons in Minnesota. The training and the vocational guidance must take into account present abilities, education, inclinations, etc. The work must tend toward bringing systematic pressure for better standards of training and for greater provision for vocational education.

The achievements of the federal government and of the several states in organizing Smith-Hughes work were presented to the convention by a group of speakers including Mr. Uel W. Lamkin, Director of the Federal Board for Vocational Education, Mr. F. N. Kirkham of Utah, and Mr. L. J. Syndell of Kentucky.

ARTHUR B. MAYS,
University of Illinois, Champaign, Ill.

One of the strong speakers of the convention was Dr. C. A. Prosser, who discussed "Fundamental Principles of Vocational Education." Speaking on vocational agriculture, Prof. David Snedden of Teachers College, New York, declared that the greatest need of America at the present time is for practical agricultural schools of secondary grade. He held that half-time and full-time schools must continue to greatly increase The training must be practical and no concessions in the direction of academic studies, must be made because of college credits.

The following officers were elected:

President, Lewis A. Wilson, Director of the Division of Vocational Education, Albany, N. Y.; First Vice-President, W. F. Lusk, Mississippi Agricultural College, Agricultural College, Miss.; Second Vice-President, F. G. Nichols, Assistant Director in Charge of Commercial Education, Harrisburg, Pa.; Third Vice-President, Ben W. Johnson, State Director of Vocational Education, Delaware; Fourth Vice-President, Helen Bridge, Director of Home Economics, University of Nebraska, Lincoln, Neb.; Treasurer, John Clyde Oswald, Oswald Publishing Co., New York City.

MR. MAYS GOES TO ILLINOIS.

Mr. Arthur B. Mays has given up his connection with the educational work of the army to accept an Assistant Professorship in Industrial Education in the University of Illinois. This is the position which Mr. James McKinney left to become associated with the American School of Correspondence.

For the last year, Mr. Mays has been Director of Vocational Education at Camp Travis, Texas, where one of the best pieces of vocational work in the army has been done.

Prior to his appointment to the army educational work, Mr. Mays had served for eleven years as head of the department of Industrial Education in the Sam Houston Normal Institute, the State Normal College at Huntsville, Texas.

Mr. Mays received his collegiate training at Bradley Institute, the University of Texas, Columbia University, and the Peabody Teachers College, taking his degree from the latter institution.

The first big problem at the University of Illinois which Mr. Mays will assist in solving is the problem of teacher-training for the part-time schools. Some of his work is done in teacher-training centers away from the University. At present he has classes for general continuation teachers and shop teachers in Rockford and Peoria. Besides this outside work, he has some residence classes.

Baltimore Convention of the Eastern Arts Association

Dr. E. B. Kent, Jersey City, N. J.

Each departing visitor who had partaken of Baltimore's hospitality during the Convention of the Eastern Arts Association, which was held there March 24 to 26, seemed to have much the same comment to make in leaving; that it surpassed all previous conventions in the main essentials of success; that no other meeting had ever produced such a blending of local hospitality and informal good-fellowship, of general sessions so full of inspiration and sectional conferences so full of pointed practical suggestion for the teacher on the job. Each one went homeward filled with gratitude to the President, Mr. Edward C. Emerson of the Boston Schools and his army of co-operators.

The sessions were held at the Maryland Institute, "the most beautiful art school in America," which in addition to its architectural charm proved most convenient for the requirements alike of general sessions, round-table meetings, and the various exhibits which were all brought under one roof. Too much cannot be said in praise of the effort and the success of Mr. Theodore H. Pond and Mr. Walter R. Gale of the local committee and of the work of the various sub-committees, which arranged the many happy features like the Thursday evening reception and the most delightful automobile excursion thru charming suburbs to the various points of local interest, such as the Johns Hopkins Library and the studio of Mr. Hans Schuler where the members were cordially welcomed by the sculptor himself.

The work of the program committee under the chairmanship of the vice-president, Mr. Fred P. Reagle of Montclair, was a model of coordinated diversity, and the assignment of both the Thursday and Friday afternoon sessions to the various special sections, art, industrial arts, household arts, part-time, secondary schools, etc., permitted a wide range of very practical discussion. Space here does not permit an account of these discussions or even mention of the topics themselves, though the following random selections may serve to suggest the general scope: "Placing Emphasis upon the Fundamentals in Art Education," Theodore M. Dillway, Boston; "The Organization of Junior High School Courses in Industrial Arts," Verne A. Bird, Director of Vocational Education, Utica, N. Y.; "Senior High School Courses in Industrial Arts," Frank E. Mathewson, Jersey City, N. J.; "The School Lunch from an Educational Standpoint," Miss Grace Schermerhorn, Supervisor of Cooking, New York City; "Foreman Training," J. C. Wright, Chief, Industrial Education Service, Federal Board, and "The Home Project in Homemaking Education," Miss Edith M. Thomas, State Supervisor, Raleigh, N. C. These and the many others will serve to make of the Proceedings a reference work of great value, not only to those who were unable to be at Baltimore but to the supervisor of more than one line of work distraught by the desire to attend three or four sections at the same hour.

The general sessions opened with a unique word of welcome from Dr. Henry S. West, Superintendent of Schools, Baltimore, in which he confessed that he began his teaching career as a high school art instructor, but that having taught in two years all the art he knew, he then found it necessary to seek other fields of endeavor. The address of Mr. James P. Munroe of the Federal Board was an earnest plea for a diversity of school instruction both in respect to art and industry, which should encourage individuality in all possible lines and thus reduce the tendency of our schools to become mere "mediocrity factories." At the general session of Thursday evening, Mr. Lewis A. Wilson of New York State gave a most inspiring presentation of the necessity for the continuation school, of the right of juvenile workers to the best that the continuation school may offer them, the tangible results already secured, and the far greater opportunities which are at hand in the field of part-time education. At another of the evening sessions Professor David Snedden, who had already appeared at two of the round-table meetings, spoke upon teaching of art appreciation in respect to the utilities of life, pointing out first that art education should distinguish between at least five different classes in the community and suggesting that the largest of these, the class of mere art consumers, might perhaps be trained more effectively thru what he called the "direct method," i. e., that to handle, criticize, and compare a varied assortment of say teaspoons would go further in teaching the appreciation of good design than the attempt to actually make a spoon. This direct education of the consumer had further emphasis the day following from Mr. Alvin E. Dodd, now Secretary of the National Chamber of Commerce, spoke upon "Lessons and Impressions For the Arts From Big Business."

A new feature connected with this meeting was the dinner arranged for the evening preceding the convention by Dr. William T. Bawden of the Bureau of Education, where more than forty early birds foregathered for a very stimulating discussion of how to increase the helpfulness of supervision in the industrial arts.

At the business meeting it was decided to accept the invitation of the city of Rochester, and to hold next year's convention there. There was further discussion of the present policy of meeting during the Easter vacation, with a decision to submit the question to a referendum of the entire membership.

The following officers were elected for the coming year: President, Fred P. Reagle, Montclair, N. J.; Vice-President, Miss Frances H. Bacheler, Hartford, Conn.; Secretary, M. W. Haynes, Bayonne, N. J., and Treasurer, A. H. Wentworth, New Haven, Conn.

AUTO-MECHANICS AT SACRAMENTO, CALIF.

All of the puzzling intricacies of the automoble engine are now being taught to the students in the auto-mechanics class in the Sacramento high school.

There is a capacity enrollment in the class. The course is a three-year one and the city and state pays one-half of the costs.

Old motors, transmissions, differentials and other parts are obtained for the students to work on.

They are torn down completely, then assembled and put in working order by the students themselves.

Along with this shop work, the students are instructed in mathematics and mechanical drawing. In mathematics there are problems in gear ratio, motor speed and the like. The mechanical drawing is done from blue prints and by taking measurements of certain parts. The idea of individual instruction is followed thruout.

The following is an outline of the first year's course in the order in which the subjects are taken:

I. Steering gears, all types. Purpose, operation, theory, adjustment, trouble, care and lubrication.
II. Springs, all types.
III. Axles, front, assembly and straightening.
V. Brakes, relining and adjustment.
VI. Clutches, cone and disc.
VII. Transmissions, progressive, selective and planitary.
VIII. Motors, scrapings and adjusting bearings; grinding and adjusting valves; fitting wrist pins; trimming camshafts; trimming magnetos; oiling systems.

Now, Are There Any Questions?

This department is intended for the convenience of subscribers who may have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from persons who are competent to answer. Letters must invariably be signed with full name of inquirer. If an answer is desired by mail, a stamped envelope should be enclosed. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Marking Tools.

58. Q:—We are having trouble in our manual training department with the "loss" of tools. We have tried locks, but as a last resort we want a means by which we can mark the tools with stencil or other method, with "Kansas City," "School Board," or some appropriate way. We have tried stamping with dies but that is not satisfactory.—S. J. L.

A:—To mark tools, warm them slightly, and rub the steel with wax, or hard tallow, until a film gathers. Then scratch the letters on the wax, cutting thru to the steel. A little nitric acid poured on the writing will quickly eat out the letters. Wash off the acid and remove the wax with a hot rag, and the letters will be accurately etched.

For etching brands and marks on polished steel surfaces, such as saws, knifeblades and tools, where there are many pieces to be done alike, procure a rubber stamp with the required design, made so that the letters and figures that are to be bitten by the acid shall be depressed in the stamp. Have a plain border around the design, large enough to allow a little border of common putty to be laid around the edge of the stamped design to receive the acid. For ink, use rosin, lard, oil, turpentine and lampblack. To ¼ lb. of rosin, put 1 teaspoonful of lard oil; melt, and stir in a tablespoonful of lampblack; thoroly mix, and add enough turpentine to make it of the consistency of printer's ink when cold. Use as when stamping with ink. When the plate is stamped, place a little border of common putty around and on the edge of stamped ground. Then pour within the border enough acid mixture to cover the figure, and let it stand for a few moments, according to the depth required; then pour the acid off. Rinse the surface with clean water, take off the putty border, and clean off the ink with turpentine. Use care not to spill the acid over the polished part of the article. For the acid, 1 part nitric acid, 1 part hydrochloric acid, to 10 parts of water by measure. If the effervescence seems too active, add more water.

179. Q:—Please tell me how to finish basswood to match mahogany, finished in a natural red finish (Walter K. Schmidt's No. 708).

Please tell me how to finish red cedar chests in a dark red and obtain a French polish.

A:—It is impossible to give an absolute, definite formula for basswood, as natural red mahogany finish may vary considerably in shade, and therefore we recommend the using of what is known as red mahogany and brown mahogany. Make a separate solution of each stain, using four ounces of the powder to one gallon each of water. Then by intermixing, say, take a part of the red, and add enough brown until you get the shade you want. You can read off the graduate, the proportion of the powder to be mixed in order to obtain a stain in dry form if you so desire. If you are matching a finished piece of wood, do not judge the shade until you have given the work a coat of shellac, and you have given the water stain plenty of time to dry naturally—Walter K. Schmidt.

Cedar chests may be finished a dark red by following these directions: The best treatment for cedar is to give the wood a coat of a mixture of one part each of boiled linseed oil and turpentine, or naphtha. When this is dry it should be followed by a coat of white shellac and two coats of varnish, rubbed dull. If a waxed finish is desired, two coats of shellac will be necessary before applying the wax. The mixture of oil and turpentine will intensify the color of the wood and prevent fading. Stain would discolor the white or sapwood, and this is not usually desirable, as cedar is mostly finished natural.

I don't believe it is wise for you to attempt a French polish. It will be much better to give the chest a good varnish finish and rub it down with rotten stone and water. After this rubbing, polish it with a good oil polish.

182. Q:—I wish to put some gold bronze on gold letters in ivory goods. What preparation is the best and how should it be done?—W. M. F.

A:—Gold bronze may be applied to ivory goods with a fine camel's hair lettering brush of the proper width by using Pratt & Lambert's Pale Gold Size Japan to do the lettering and as soon as the material becomes tacky, sift on dry bronze from a piece of cheese cloth, whereupon the size will absorb it and produce a very pleasing effect. After the letters have hardened for twenty-four hours or more, they may be cleaned up by scraping gently along the outline with a safety razor blade or other equally sharp instrument.—Ralph Waring.

185. Q:—I should like the formula for a putty which can be used under a white enamel job, and which will not discolor the enamel, nor shrink when dry.

Are concave surfaces over a nail hole, filled with putty, the result of faulty putty or what?

What is used with white enamel to produce a good French Grey enamel?—F. C. R.

A:—1. A good putty for any kind of work which will not shrink or discolor an enamel job may be prepared from whiting, 2 parts, lead in oil, 1 part, and enough boiled linseed oil to make up to a very stiff putty. No wood should be puttied up until the primer coat of either varnish or flat white has been allowed to dry. The mistake is often made in puttying up underneath the priming coat in which case the wood absorbs the oil and allows the putty to shrink.

2. Concave surfaces over nail holes puttied up result either from absorption of the oil from the putty by the wood as mentioned above or because of the fact that the putty was too soft and therefore gradually settled into the hole. Putty for this work should be quite stiff and should be cut off clean at the surface with a knife while held down under pressure of the thumb.

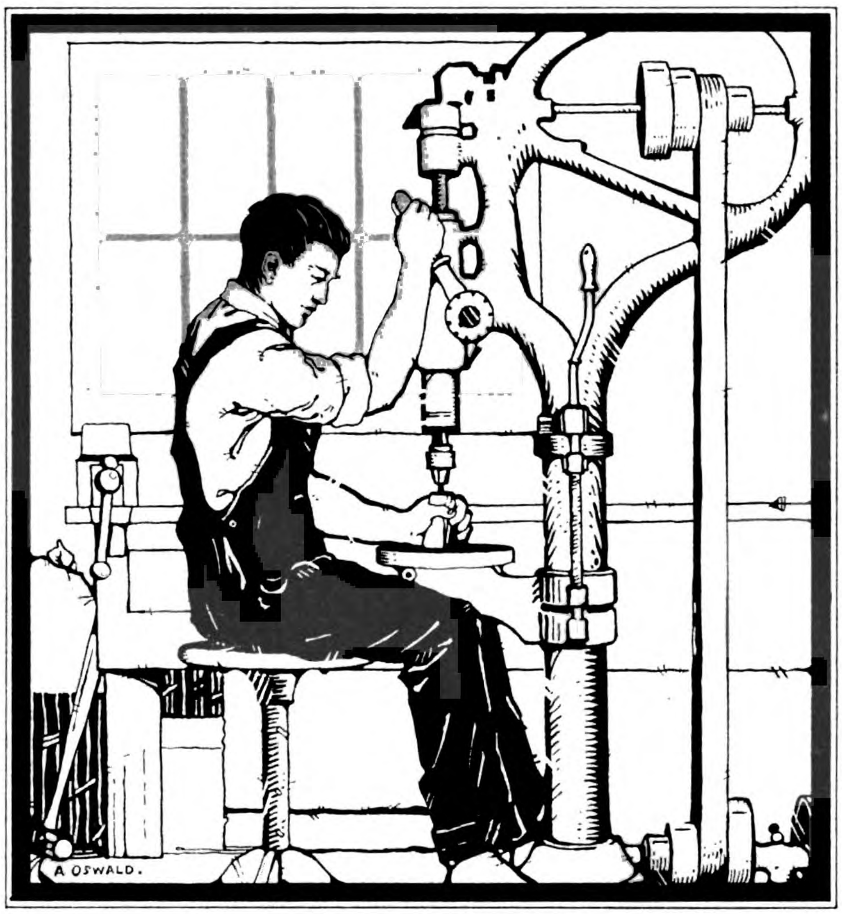
3. White enamel may be tinted to French grey by using a very little ivory black ground in japan. Any shade of enamel may be reached by tinting with japan ground colors which can be most economically purchased in artists' tubes as prepared for pallette work. With this form the tube colors do not dry up and waste and are the purest and most brilliant shades obtainable. Be particular as to securing japan colors since the oil ground colors slow up the enamel and retard its drying.—Ralph J. Waring.

Tests in Cotton Culture. Under the direction of Mr. W. M. Ellison, teacher of agriculture, and Mr. Richardson, county farm demonstrator, the schools of Brownsville, Tex., will carry on some practical tests in the breeding of Durango cotton, a staple variety which has proved well adapted to the section. Some experiments in budding and grafting of varieties of citrous fruits, as well as studies in potato culture, are planned. Each boy is given a plot of ground and is held responsible for the results. The section around Brownsville has a semi-tropical climate and fruits and winter vegetables thrive well.

Course in Job Analysis. State Supt. A. O. Thomas of Maine, in cooperation with Supt. T. C. Morrill of Bangor, has introduced a course in job analysis for industrial teachers. Two afternoons each week are given to the work, with the aid of a special teacher of the trades and industries. The course aims to offer the teachers the knowledge necessary to the analysis of a job, making it possible to present it in better shape to the pupil. The method of presentation is that used so successfully in the shipbuilding industry and the teachers have become enthused over the work.

Shop Teaching at Bangor, Me. With the reorganization of the shop teaching in the schools, the classes are performing actual work on a productive basis. Brass and steel has been donated to the classes and students construct parts of wet pulp and paper machines. These are made under shop conditions, and the finished work is returned to the iron foundry where it is assembled with the rest of the machine. The shops are also busy on an extensive setting of scenery for a school pageant. Kindergarten equipment, book closets and general repair work are also attempted by the classes.

The INDUSTRIAL-ARTS MAGAZINE



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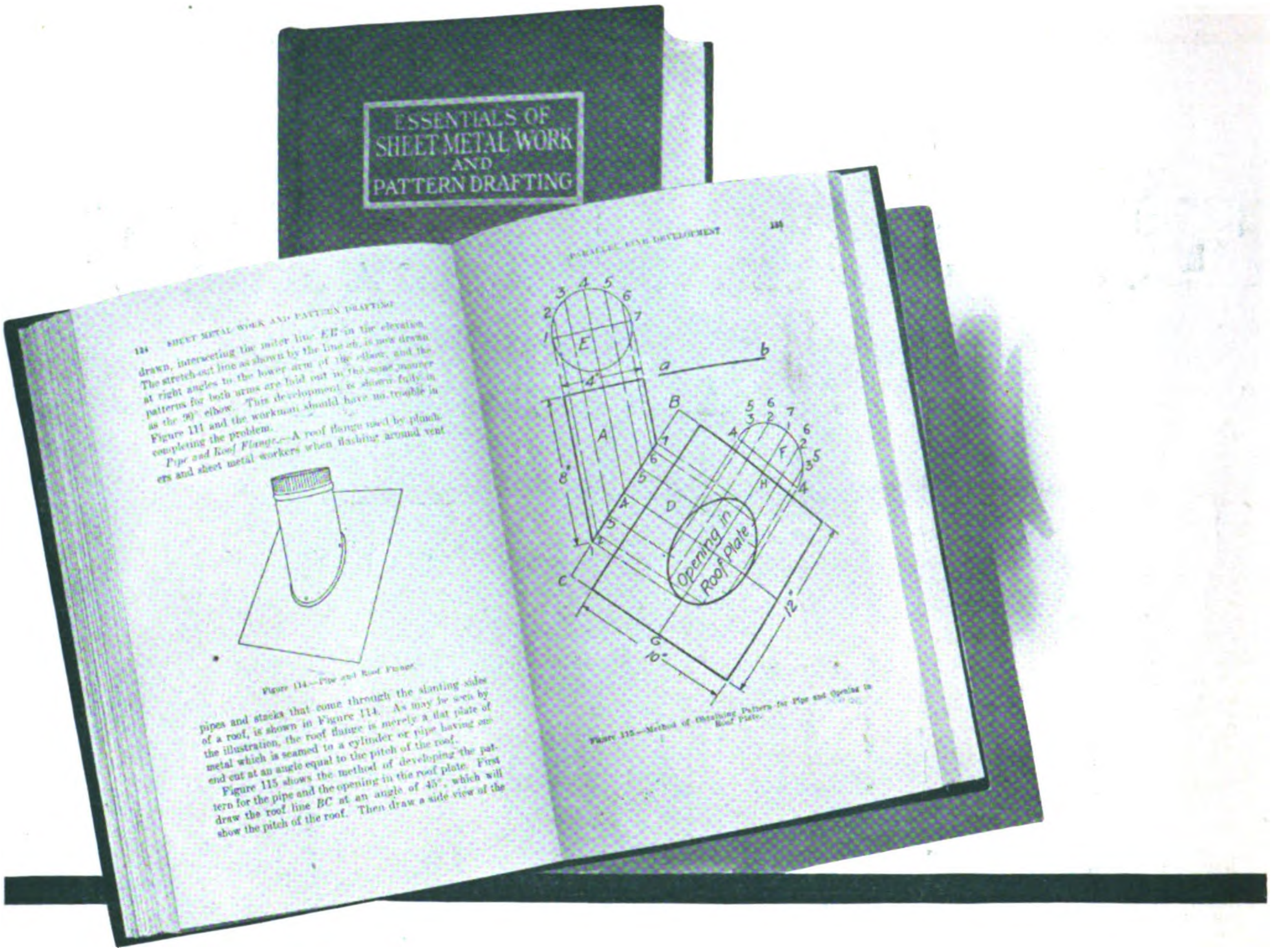

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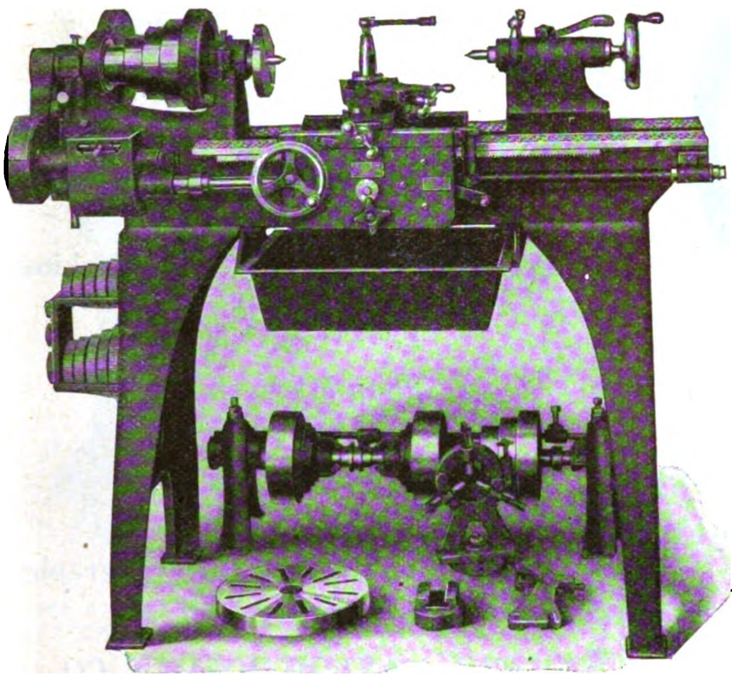

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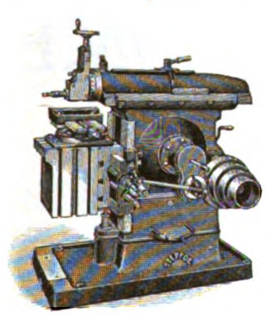

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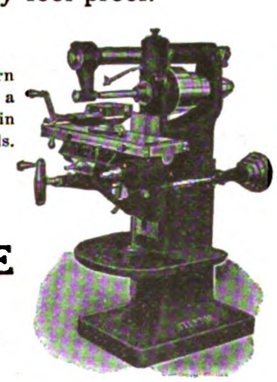

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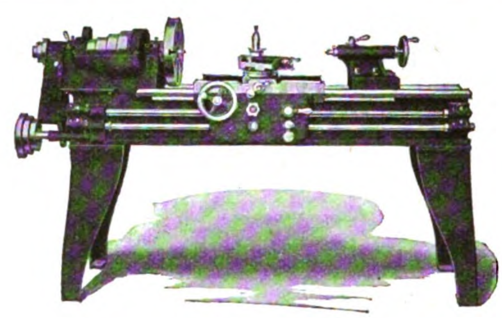

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SUBSCRIPTION INFORMATION

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INDUSTRIAL-ARTS MAGAZINE

Volume X JUNE, 1921 Number 6

Organization and Administration of a Continuation School

E. M. McDonough, Acting Principal, Boston Continuation School

COMPULSORY continuation schools are the direct result of a concerted attempt in education to make employed minors efficient producers, economical consumers and contented members of society. They are training children to ultimately take their places as industrial and civic units in our scheme of social society. They are offering to all employed children equal educational opportunity to improve their status in the industrial, commercial and agricultural world; and to eliminate the economic waste caused thru non-production of unemployables whose vocational adaptability has never been determined. Society, economically dependent upon production and socially dependent, upon intelligent citizenship, must benefit thru the operation of the part-time school.

Children to Receive Instruction.

The number of children who continue at school beyond the completion of the sixth grade which is a requirement previous to the granting of an employment certificate, and the number of children who leave school and enter employment are equal. Investigation has proven conclusively that 41 per cent of the children attending the Boston Continuation School, have left school and obtained employment because of economic necessity, 24 per cent because they cannot carry on the work of the regular schools, and 35 per cent because the idealistic work of the regular schools does not appeal to their practical minds. This last group are desirous of going to work; they are adaptable to concrete rather than abstract instruction and are impatient to enter employment.

Reasons for Leaving School.

Statistics compiled from accurate investigations of 5,425 children attending the Boston Continuation School October, 1920, show the following causes of elimination:

Economic necessity	41% Boys	47% Girls
Wanted to go to work	18% Boys	14% Girls
Disliked regular school	27% Boys	16% Girls
Slow progress in school	11% Boys	6% Girls
Graduation from elementary schools	2% Boys	8% Girls
Illness	1% Boys	9% Girls

Facts Concerning the Amount of Education Received by These Children.

Twenty per cent are high school pupils—mostly those who made failures in academic work, and seldom forced out by poverty. Most of them are lacking in fundamentals, so they fail to keep up in their studies. Forty per cent are elementary school graduates. These children are almost in toto capable and well trained and should be given a high school education. Forty per cent are children from the sixth, seventh and eighth grades. A large percentage of these pupils are children of foreigners from non-English speaking homes, the whole atmosphere of which tends to get the child to work early in life. Their slow progress in school is largely due to the fact that it is difficult for them to think quickly in the English language. The remainder are either motor minded children to whom abstract instruction does not appeal or pupils abnormal or subnormal in mental equipment.

Children in Continuation School.

The children attending the continuation school may be classified as follows:

1. Those fitted for a particular kind of work, and those who have no apparent vocational ability.
2. The child with considerable ability for academic work and little for manual work.
3. The child with unusual manual skill and normal academic ability.
4. The abnormal child who possesses very little ability either mentally or manually.
5. The motor-minded child, who is lacking in academic skill, and is a genius on manual work.
6. The normal child who has equal manual and academic skill.

It is patent that the instruction given in the continuation school must be determined entirely by the scholastic equipment and the future objective of the pupils who are required by law to attend this unique type of school. Sixty per cent of the children are elementary school graduates, and therefore the major problem is one of producing suitable instruction for graduates of elementary school, four hours per week, 40 weeks per year in the interim between their four-

teenth and sixteenth birthdays. Each employed minor who attends is anticipating his future place in industrial and civic society, and is seeking to ameliorate his working conditions and to progress in the business world. Subjects designed primarily to increase the individual child's civic and vocational intelligence must be taught in the continuation school. The content of the courses of study should be determined essentially with this basal objective in view. The method of instruction is dependent largely upon manners of presentation and class procedure peculiar to the period of adolescence with its pronounced physiological and psychological effect. The salient characteristics of the adolescent which are particularly pronounced in Continuation School instruction and which bear direct relation to the work are: insistence on personal rights, gang spirit, independence, analysis, wanting to know the reason why of things, intense restlessness and insistence on receiving "a square deal." Interest and apperception are admittedly the two leading psychological factors and can be utilized very effectively in instruction.

Manner of Enrollment.

Any child between the ages of fourteen and sixteen who elects to leave regular graded elementary or high school and procure employment may do so provided he fulfills certain requirements. In order to obtain an employment certificate a child under sixteen years of age must obtain: First, a birth certificate as evidence that he is at least 14 years of age; Second, a record from the last school attended attesting to his completion of the sixth grade, and that he has attended the regular day schools at least 130 days since his thirteenth birthday; and Third, a promise of employment card signed by his prospective employer. Having fulfilled these three essential conditions prior to the granting of an employment certificate, the child must present himself for physical examination to determine his fitness to perform the duties of his elected employment. If the applicant passes the doctor's examination successfully, he is given an employment certificate for his future employer at the Boston Certificating Office. The minor then proceeds to the continuation school, is enrolled, assigned to attend on a stipulated day and hour, and advised as to the location of the class. The employment certificate is then carried by the child to his future employer who employs the child "under the authority of an employment certificate" and subject to the provisions governing such employment.

Internal Organization and Administration.

The functions of the continuation school have been long since specified and defined. They include (1) Training for future citizenship; (2) A review of the child's previous education with the purpose of emphasizing its importance; (3) The establishment of an efficient employment bureau to eliminate time wasted thru unemployment, and place vocationally those fitted for particular employments; (4) Vocational guidance and follow-up work; (5) Linking up school work with the child's job wherever possible, thereby giving strictly trade preparatory and trade extension training; (6) The introduction of prevocational activity as a means to discover the child's vocational aptitude thru a series of prevocational experiences.

These prevocational activities determine what the individual is fitted for or what is equally important for what he is not fitted. The negative of the conclusion becomes a positive asset which aids the child in the future selection of his work. The instruction to be pursued in any continuation school naturally is divided into, first, civic instruction, and second, vocational instruction. The civic instruction given in all continuation schools is constant, since the rights, duties and obligations of citizenship are universally the same. On the other hand, the vocational education given in a continuation school must be based on the needs of the local community and the wants peculiar to the dominating industries and commercial activities of the city where the school is situated. It is obvious that the problems of the east in vocational part-time instruction are not essentially the problems of the west or the problems of the middle west.

In addition to instruction in industrial and commercial occupations, the large ports of entry in the east, New York, Boston, etc., have analogous problems; namely, the serving of groups who are determined by the economic factors which have caused not only the cosmopolitan population of these cities, but also the numerical population, and the type of work which the people are engaged in. These cities are large manufacturing, commercial and distributing centers and also ports of entry where immigrants first arrive and the tendency is to remain. These immigrants demonstrate very markedly their own racial characteristics and tendencies. In spite of the Americanization campaigns which are attempting to obviate the bane of the present herding according to nationality, these immigrants insist on living as nations and classes within a nation. Their homes for the most part constitute the slum districts of these cities where long rows of dingy tenements appear to be their perpetual abode. This reduces the level of American living conditions to a squalid plane and creates a very poor environment for the future education of their offspring. Their children then are handicapped from birth by difficulty to think clearly and quickly in the English language, being as they are products of non-English speaking parents. In their homes conversations are constantly held in their native tongue and foreign newspapers are read, reeking as they are with radical theories. These children handicapped both by birth, environment and previous education, at the age of fourteen years are automatically forced out of school and compelled to go to work to help support their parents. This group constitutes a considerable percentage of any continuation school inaugurated in the large eastern cities of the United States. Forced out of school as these children are, and

compelled to earn a livelihood by the cruel mandate of poverty which has determined to a great extent their future career, they find themselves in free America, which boasts of equality of opportunity, facing handicaps which can only be overcome thru efficient instruction in part-time schools.

With these essential functions of the school in mind there should be classes in industrial and commercial courses. The industrial courses should include classes in machine work, woodworking, printing and bookbinding, electrical work, auto repairing and mechanical drawing for boys; and classes in household arts, home budgeting, sewing, millinery, cooking, nursing and power machine operating for girls. The commercial courses should include office routine, business practice and elementary salesmanship, store merchandising, bookkeeping and typewriting for boys and girls. In addition to the aforementioned courses, there should also be general improvement classes for the further prosecution of academic work those whose mental equipment is limited and also a reservoir class the curriculum of which is so designed and organized as to facilitate study of the child's vocational aptitude and serves as the source from which the other classes are supplied with candidates to pursue the various courses. All classes are segregated according to sex and the boys' and girls' divisions are housed in separate buildings. The instruction of the school is divided in all industrial and commercial classes into two hours of shop work and two hours of related and cultural work. In all general classes for the further prosecution of academic education, the entire four hours of instruction is given to a study of the three R's, basing the work on interest factors in order to hold the attention of the children. The studies which should be pursued are instruction in shop projects or commercial occupations, according to the election of the student for two hours of the four hour period, and the remaining two hours should be assigned to academic schooling in commercial arithmetic, commercial correspondence, biography, history, community civics, business spelling, industrial and personal hygiene, and commercial geography.

The following chart is illustrative of the time allotment to the various courses:

Program of Studies.

General Improvement Course—
- 8-9 o'clock—Commercial correspondence, community civics.
- 9-10 o'clock—Commercial arithmetic.
- 10-11 o'clock—Business spelling, commercial geography.
- 11--12 o'clock—Business English, Industrial and personal hygiene.

Prevocational Trade Instruction—
- 8-9 o'clock—Trade Instruction.
- 9-10 o'clock—Trade Instruction.
- 10-11 o'clock—Shop mathematics, industrial safety, personal hygiene.
- 11-12 o'clock—Trade and Cultural English, Spelling, Community civics.

Prevocational Business Practice and Salesmanship—
- 8-9 o'clock—Business English, business spelling, community civics.
- 9-10 o'clock—Commercial Arithmetic, personal hygiene.
- 10-11 o'clock—Business Practice, Commercial Geography.
- 11-12 o'clock—Salesmanship, Debating.

The aim in all continuation school instruction is to make the work as practical as possible, and duplicate actual industrial and commercial conditions. All the shops are equipped with man size machinery and a commercial product is produced. These commercial products are possible in the machine, woodworking, sheet metal, printing, and power machine departments. The electrical shop due to child labor laws which prohibit the performance of outside installation work by children 14 to 16 years of age is thus restricted in production. A series of commercial exercises is substituted for actual production in the electrical trade instruction. The products of the different shops are quickly sold either to the children at cost, or to manufactures at a selling price slightly more than the cost of the material employed in the production. The academic instruction in all prevocational classes is linked up closely with the trade or commercial instruction given in the shop. All the work of the school is clothed in interest factors which underlie the very fabric of instruction. That which is practical appeals to the working child whereas mere theory does not attract. One of the constant problems of the continuation school teacher is the application of ingenuity and resourcefulness in the discovery of new methods of creating interest.

Schedule of Assignment.

The pupils attending continuation school are assigned to class on a particular day according to their previous scholastic training. For all trade classes the following schedule of assignment has proven very practical:

Monday, Seventh grade boys and girls.
Tuesday, Eighth grade boys and girls.
Wednesday, high school boys and girls.
Thursday, elementary school graduates.
Friday, Sixth grade boys and girls.

Grading pupils according to their previous scholastic attainment forms a very effective grouping for instruction. The utilization of the different days in the school week operates to best attain this end in all industrial courses. Commercial classes presuppose a constant minimum scholastic requirement, e. g., typewriting requires the completion of at least one year of high school instruction. It is obvious, therefore, that candidates for commercial courses can be assigned to any day in the school week inasmuch as the initial entrance requirement is the same for all students. Em-

ployers cooperate willingly in the original assignments of their employees to attend school. The requests for a change of day are very few, not more than 2 per cent of the entire student body requesting a change thru their employers.

The Reservoir Class.

On entering the part-time school the pupil is immediately assigned to the entry or reservoir class. The importance of this class in all continuation school work cannot be over emphasized. It is the crux upon which all instruction depends. The success or non-success of the vocational instruction given depends largely upon the apperceptive basis which is first formed by the pupil on his day of entrance and stimulated thru his residence in the reservoir class. As the name implies, this forms the fountain from which the other classes are supplied with talent.

The different phases of vocational activity, the qualities and aptitudes required in all vocational fields, the scholastic attainment which the candidates who intend to pursue these courses must possess are here enumerated and explained in detail as well as the positive physical handicaps which would debar any individual from prosecuting a particular trade or vocation. Vocational selection and choice is constantly urged on the pupils thru environment and practical appeal. The child is shown the products and the actual workings of the different trades and occupations which he or she may be interested in. In this manner their vocational aptitudes and penchants are studied. If the pupil can meet the scholastic acquirements which are pre-requisites in all vocational work, he is then permitted to pursue the course of his election.

After a sufficient trial in the selected class, the pupil either finds that he is suited for the work or has no vocational adaptability for it. The negative of the foregoing conclusion is equally important with the positive, for it becomes very definite information for the child's guidance in the future. Assuming that the student does not like his first choice he is given a second, third, and fourth, and if necessary a fifth choice, and if at the completion of his continuation school career he has found out definitely the type of work for which he is fitted or that for which he is not fitted, the part-time school has been a positive benefit to him industrially.

It must not be imagined that transfer within the continuation school is easy. Transfer should only be possible when the child evinces a sincere desire to change his course; he should have a reason for doing so, and this reason should receive the approval of both his employer and parents. In addition to these conditions he should also remain in a particular course a sufficient length of time to prove conclusively that his reason for changing is not a transient one but is founded on real causes. Freedom of choice in all part-time education cannot be encouraged too strongly. It is the broadest avenue open to success and to the self-discovery of latent powers and possibilities inherent in the child.

Follow-up Work.

In order to give efficient instruction in a part-time school an effective system of follow-up work should be inaugurated. Boston has devised a unique scheme of visitor work consisting of visits to the homes and places of employment of these employed minors. The obvious purpose of this visiting is to study the social and industrial atmosphere in which these children live and toil. The information procured is of inestimable value in furthering the instruction of these minors vocationally. The cooperation of employers, which is highly desirable, is obtainable thru an efficient system of follow-up work. This unique type of school which is peculiar to part-time and cooperative courses enlists the sympathy and cooperation of the employers in the education of their employees. Visitor work forms the link which aids the teacher in giving instruction on any subject. The trinity of responsibility between the child, his employer, and his school is especially emphasized and is made the basis of effective training in citizenship. On the other hand information procured by the instructor in his follow-up visits to the homes and places of employment can be utilized in furthering the instruction of the employed minor and in preparing him for his next natural step in progression. The importance of follow-up work cannot be overestimated since the success or failure of the instruction in the school depends upon the information received thru efficient follow-up visits. The truth of the above statement will be particularly apparent when it is remembered that one of the functions of the continuation school is always to help and instruct on employment, making the employee a more competent producer and a more contented member of society. Approximately one-third of each teacher's time should be spent in visitor work. The daily program of all instructors should consist of four hours of instruction and two and one-half hours of follow-up work.

(Concluded in July.)

A great many persons try to do everything with a short line. The fish that lie sleeping on the coral bottoms of Turtle Harbor, twenty feet under the bottom of your boat, cannot be reached by your holiday line of twelve feet and no more.

To leave school with only half a preparation, or to run away from your trade without full training, is to go out into life with a short line that will not give you success.

JOHN WANAMAKER.

COOPERATION OF THE SHOP AND CLASSROOM

Leroy M. Twichell, Director Continuation School, Malden, Mass.

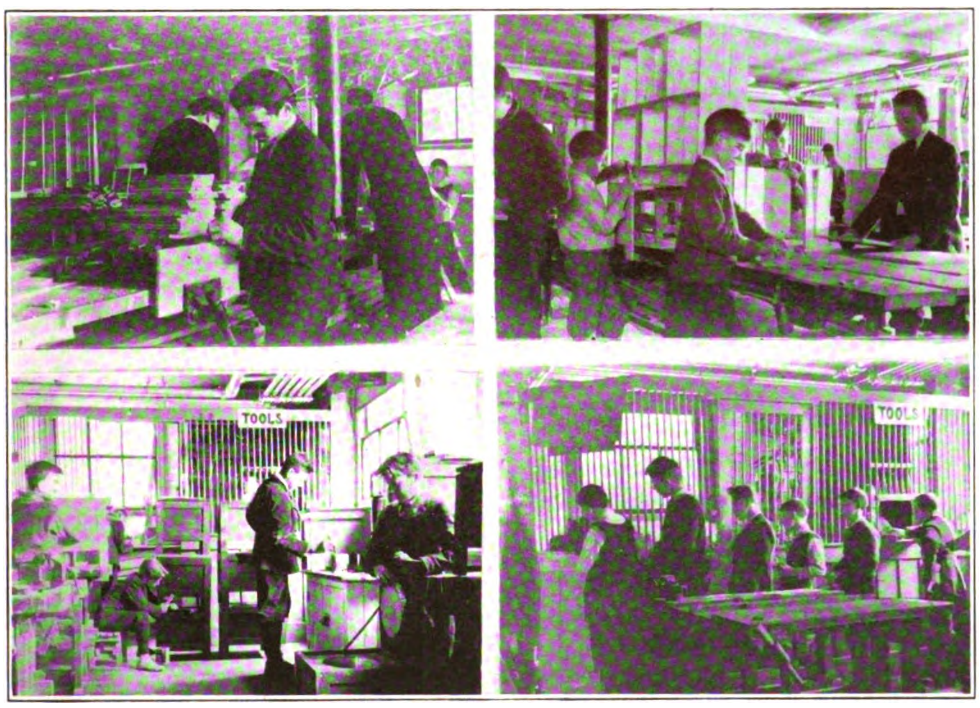
IT HAS not been a great while since the various forms of industrial work in the public schools were on the defensive. During that time, many and varied have been the points of argument between friends of this movement on the one side, and those on the other side who considered it an expensive appendage to an already over-crowded curriculum. We have anxiously watched as the cause has been nursed thru feverish periods of over-emphasized talking on points such as "motor coordination," "manual dexterity," and "cultural values." We have held the spoon while it has been forced to swallow large doses of formal discipline, which, by the way, almost caused its demise.

From this mist of varied and partly-formed ideas, educational thought has gradually crystalized until our aims have become somewhat definitely established. We have come to realize that in the sense of the training of the lower grade hand work, the cultural values of the elementary industrial arts, the prevocational experience of the junior-high school, and the training for specific ends of the vocational school, it is the boy and the girl, after all, that we are trying to develop.

One of the best things we have done is to substitute social values for formal sequence ideas. We have put out the "coat-hanger" fiend from among us. Except for a few uncovered spots, he had gone, script and scrippage.

The best thing that we are beginning to do is to bring the classroom to life by interpreting its subject matter in terms of the world's work, and thus provide a point of contact. Loud has been the cry for motivation or vitalizing of school work. Those subjects that are seemingly so far removed from the immediate needs of the pupil, should be given more appeal, we have been told.

Here then, it would appear, is our opportunity to tie up a series of shop activities with classroom subjects, usually presented in a more or less formal manner, until both are united in a common project that lends itself to the sympathies and appreciation of the pupils.



THE CLASS AT WORK ON A COOPERATIVE PROJECT.

This is by no means an easy task. If, however, the pages of history are to cease to be merely sear-and-yellow leaves from a dead past, and can be brought to reflect life in the doings of our workaday world; if the ability to use good oral and written English can be something to wish for, because the need is felt; if arithmetic shall become one of the many tools with which to work, rather than something to be learned; if places on the map are to become important because they hold or have held materials that we need or use, and because something is going on there in which we are interested; if science can explain some of the wonders with which we come in contact; then related work is worth while and the teachers of related work have not striven in vain.

The possibilities of this sort of work are endless. There are, however, several problems to be solved. One of these relative to organization, is whether this kind of a proposition can be successfully operated in school systems where large classes, uniform requirements, and departmental supervision of classroom subjects make it impractical to use methods which are essential to this kind of work. Large classes are impossible if the work in the shop is to be arranged to furnish the greatest inspiration or basis for classroom activity. Uniform requirements must be stated in terms of essentials to be covered and not in specific or detailed outlines of no elasticity. As to the supervision of classroom subjects, often by persons of academic and institutionalized tendencies, somewhat out of touch with the grades in question, and entirely unfamiliar with the aims and values involved, and sometimes unsympathetic toward its achievements; the least that shall be asked is that these people shall endeavor to get an understanding of the thing they are supposed to assist in.

If given a reasonable opportunity, a team of interested teachers can lead a group of pupils to see that there is something to school work besides that which would otherwise be considered, by the less imaginative members, as a useless grind. In fact enthusiasm may be aroused.

A project carried thru by two classes in the Central Street Junior High School at Springfield, Massachusetts, may serve to illustrate the method of attacking a related-work problem. This project, the making of 25 fireless cookers, has been chosen because it represents two activities, woodworking and sheet-metal work. Indirectly the cement and printing departments were also affected.

The work in the shop and that in the classroom should of course, proceed together, because academic work that is related to shop work in general rather than a specific job is of little value.

Pupils in the practical-arts department, including the two classes mentioned, spent ten of their 35 periods per week in the prevocational shops, changing their activities at the end of every ten weeks, this large amount of time being justified by the material and inspiration received for classroom subjects as well as by the tryout experience of the various activities. All arrangements were made possible by Principal A. T. Talmadge, who, being interested in this work, was determined to give it a tryout.

Thus having set the stage, let us proceed with the program. The members of the Jr. II woodworking class, after discussing the merits of a fireless cooker, readily accepted the suggestion that they construct the cases for a number of these utensils. Accordingly, a set of shop cards were made up, giving specifications and working drawings for a fireless cooker that would meet the home needs of the boys' families. These were explained with blackboard sketches and demonstrations, and then given to the boys who were to act as foremen of the various groups. The stock clerk was called upon to issue lumber and supplies to the various departments. The tool man passed tools thru his wicket in exchange for a slip written and signed by each boy. The time clerk made ready his blanks and work sheets and the hum of industry was on.

During the discussions and explanation of the job cards, each boy had filled out his assignment sheet which he carried to his classroom. On this sheet he had all the necessary data for starting the related work in the class. A similar sheet was then sent by the shop instructor to the teacher. This is not by any means all the necessary communication between these two people. The class teacher is seldom an experienced mechanic. Therefore, he or she will require considerable explanation in addition to the specifications and drawings. Likewise the shop instructor needs to know the limitations and possibilities of the class procedure. He should know also what topics the teacher wishes to cover in the various subjects so that he may plan the shop work to include as many of these as practical. Altogether there will be need of many conferences, as cooperation to the limit is the keynote to success.

Each day when the class came to the shop, a few moments were devoted to the discussion of the work and its progress, other related work assignment sheets were made out, and interesting incidents and experiences in the trade were told by the instructor, related industrial topics and shop ethics were introduced.

Occasionally a period from the shop time was taken for stereoptican stories of forestry, lumbering, milling and manufacturing.

During all this, instruction in the operations was not neglected. Formal sequence in tool operation, other than that demanded by the logical procedure of the job, was eliminated. Criticism of poor work was mostly in the form of encouragement to do better rather than condemnation.

All this while, the boys in the Junior III class were laying out, cutting, forming, seaming and soldering sheet metal. They were making the wells and metal parts for cookers. Aside from the material and operations, their organization was similar to that of the woodworking group.

Elementary science, being one of the subjects taken by this group, was worked out in the shop with the shop instructor. Many topics were directly related to the cooker and its making.

A third class in cement work made the concrete heating elements for the cookers, and of course, the class in printing furnished all printed forms for the shop and classroom work. Finally, as the last week of the ten arrived and the business of the finishing department was flourishing, many requests for cookers were received by the clerk. Pupils from the other classes, teachers and outsiders seemed to realize their need of a fireless cooker. Members from the classes came first, however, and after their wants were filled there were but few cookers to be had.

HEIRLOOMS OF THE PRESENT AND FUTURE

Charles A. King, State Normal School, Plymouth, N. H.

WHO IS not sensible of the subtle charm, the dignity and the atmosphere of repose and classic simplicity characteristic of homes in which the decorations and furnishings are centered around cherished pieces of old mahogany, silver, pewter and other reminders of cultured ancestors? It is not strange that their present owners value them so far above their intrinsic value that they are never thought of in terms ot dollars and cents. The atmosphere of good taste and refinement ever present in these homes is emphasized by its absence from homes furnished with the nondescript suites produced in enormous quantities during the years in which atrocious adaptations of period and historical designs held a strangle hold upon the popular taste in home decoration and furnishings.

For two generations beautiful pieces of mahogany were out of style and, if not destroyed by neglect or abuse, were relegated to menial uses or stored in attics or lumber rooms. Thru avarice or indifference many of these pieces passed out of the family and in some cases fell into the hands of those whose artistic taste and vision, or business instincts foresaw that some time good taste would again dominate the furnishing of the homes of people of intelligence.

Many pieces of furniture owned by descendants of the pioneers were made of timber cut from the ancestral acres; usually of random design, made with the rough tools found upon a frontier farm, and often of mediocre craftsmanship, there is seldom anything but age, authentic history and family sentiment to explain the reason for their hold upon the family affections. Such pieces are of little value to the dealer or collector whose interest in the antique is based, not upon family sentiment, but upon excellence of design, workmanship and historic significance as expressed by conformity to historical and period types which are the main contributory factors to the present popularity of old mahogany. In other words, heirlooms to be appreciated by those who have no sentimental connection with them must have the subtle proportions, and that form and workmanship, which, regardless of any other quality, or of sentimental considerations would place it among works of art. Such pieces of good design and workmanship are in accord with the best artistic ideals of all eras of the world, and will forever maintain their dignified simplicity; while fads and fancies in various types of furniture come and go, these pieces are ever the inspiration of the lover of the beautiful. The length of reign enjoyed by a fad depends upon the degree to which it conforms to true form and proportion when weighed in the balance of good taste, for within the degree of true beauty which it possesses will be found the

FIGURE 1.

FIGURE 2.

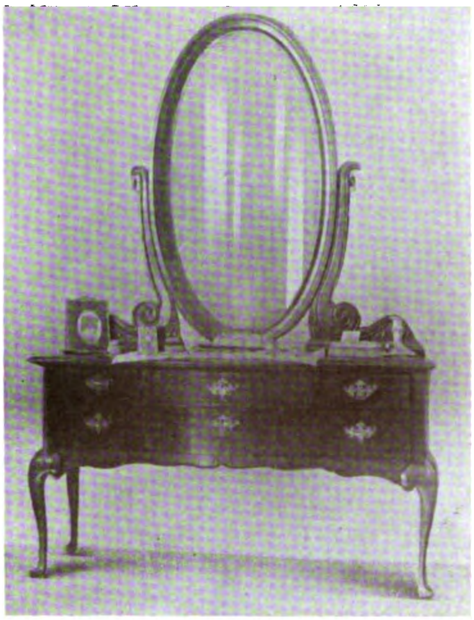


FIGURE 3.

factors that limit its reign, and indicate the degree of cultured intelligence of its devotees.

An increasing number of purchasers refuse to follow the methods of acquiring furniture which has obtained during recent generations, when the average purchaser made his selection piecemeal from miscellaneous assortments of ready made furniture of all grades and prices. More than ever before does the expression of the popular taste indicate that people from all walks of life realize that simplicity is the fundamental principle of all good design, and that the beauty of a piece of furniture depends as much upon its relation to its surroundings as upon its individual qualities. To the extent that modern methods of production permit and encourage, we are acquiring methods of furnishing our homes which three generations ago were inseparable from the purchase of such important pieces of furniture as the eighteenth century highboy, table and mirror frame shown in the illustrations. Usually such important additions to great grandfather's household equipment were built to order; the grain, quality and form of each piece, and each detail of construction was carefully scrutinized and considered, to insure that the material and workmanship were worthy of their high destiny.

Furniture was built for permanence in the days of our ancestors, for it was the sentiment of the times that a need of the home once satisfied should never occur again; it was taken for granted that the piece would satisfy similar needs thru succeeding generations until finally worn out by service. The popular idea of the immediately preceding generations was to change the furniture in accordance with the dictates of Dame Fashion, or, as a change in worldly circumstances made it possible, to refurnish the entire establishment; hence it was not necessary that a piece should be built with any regard to its use beyond the immediate needs of the original owner. However, there is a considerable and rapidly increasing number who believe in building furniture of such design and workmanship that it will always be worthy of a place in their homes or in the homes of their descendants. These, like their ancestors, believe that furniture indicates the culture and the ideals of those who occupy the home, and endeavor to surround themselves with accessories which express their personality.

The laws of design and ideals of fine workmanship have resulted from the elimination of undesirable features during different stages of furniture development, and the incorporation of those elements which were pleasing and harmonious. From the times of the great masters of furniture making, in whose work the climax of furniture designing seems to have been attained, down to the present time nothing essential has been permanently added to either design or workmanship. The best designs of today are based upon the same laws which guided the great masters, tho the liberty of personal interpretation of these laws is by no means curtailed. Many interpretations by different individuals have resulted in beautiful pieces showing the personality of the designer, which may well rank with the best work of the old masters; but no interpretation which differs widely from their motives has yet obtained a footing or degree of permanence which indicates that it would ever be conceded a place in the history of furniture development comparable with the work of the late eighteenth century.

Despite the fact that much of the furniture built today is of the "Built to Sell" type and will barely endure the service of one generation, there has never been a time when it was possible to purchase better. Custom made furniture of the present time can be as well designed, better made, and a more desirable and larger variety of materials is available than ever before.

Many pieces made today which will be heirlooms to succeeding generations are reproductions, adaptations or combinations of the work and designs of the old masters. Possibly some of them are destined to play false parts in years to come, for they may be sold as real antiques to people who do not know the ear marks by which the genuine may be detected. Many of these

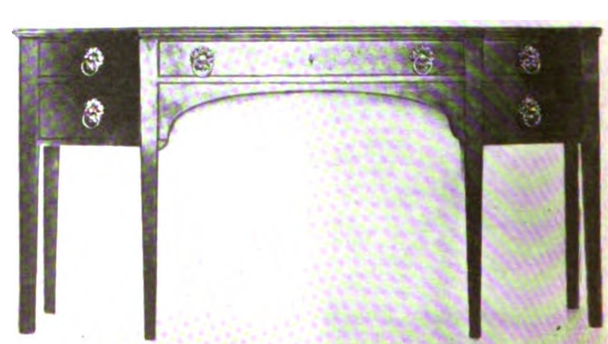


FIGURE 4.

pieces are practically hand made, and so closely reproduce the work of the old time, that in a century it will be difficult to be certain whether a piece is an exceptionally well preserved genuine antique or a reproduction. In fact, commercial conditions governing the antique furniture business are much the same as those which have brought into being the many spurious Rembrandts, Rubens and others of the old masters of painting.

The low boy with the cheval mirror is an excellent adaptation of eighteenth century designs, while the simple elegance of the buffet and sideboard are strongly suggestive of Sheraton influence. These are fine specimens of the type of furniture which is being made to order by skilled craftsmen who can accurately reproduce the ancient ideals and craftsmanship, to satisfy the demand of discriminating purchasers. Many such pieces will descend as heirlooms thru generations which will appreciate and cherish them, for the taste of the people is being so educated that beauty of form and proportion and the mellowness of color and finish is preferred to obtrusively new furniture of faddish or fanciful design and garish polish.

These reproductions are typical of but one phase of the present stage of furniture development, but the influence of the old masters, so long ignored, has at last come to the front, for, thru them this generation has learned that only in simplicity of form, construction and decoration may permanently satisfying beauty and service be found. Future generations will consider the types known as "Mission" and "Craftsman" as typical of the early twentieth century, tho these terms are applied indiscriminately to all furniture which has straight lines and is covered with a dark stain. So much poorly designed and shoddy work has been perpetrated under these names that they are not the guarantee of merit they should be; their very simplicity of design invites poor work, and encourages attempts by those who do not possess the taste to design nor the skill to properly apply and execute the best methods of construction. Well made craftsman furniture should last as long as the wood itself, and unless destroyed by fire or abuse, much of the work of the present day will be

FIGURE 5.

FIGURE 6.

in existence and in good condition after hundreds of years.

The popular interest in hand work, home craftsmanship and the manual arts of the schools is an important factor in the uplift to the popular taste. Few families within the range of the public schools but have one or more pieces made in the manual arts classes; often these have been so constructed that they do not have the strength characteristic of the type. This is especially true of many of the pieces made by children of the grade schools, who are easily satisfied, and whom the teacher allows to use forms of construction which would not be permissible upon ordinary commercial work. But more mature students may well be proud of both the design and workmanship of such pieces as the seat which was designed and made by a seventeen-year-old student, and the table, which was made by a young lady of a normal school. The seat is a characteristic craftsman design, with its straight lines and apparent strength, but without the clumsy massiveness of the mission furniture, while the design of the table partakes of the delicacy of the old masters. A great deal of furniture of these types will descend for generations, for each type is satisfying in design, workmanship and utility.

Heavily proportioned mission or craftsman furniture is suitable for large rooms only, as they require perspective to be properly appreciated. Tho the hall, dining room and library are the legitimate places for large and massive furniture, any room may be furnished in the craftsman style if suitable pieces and proportions are selected to harmonize with the size, purpose and decoration of the room, for example, the craftsman type of table shown in the accompanying cut. It is possible that in another century fine examples of craftsman furniture, because of their originality, excellent design and unquestioned authenticity, may be considered of more interest than exact copies of the old masters, which, like copies of the great painters, will be considered of slight artistic or historic value.

Only in the homes of the discerning, not necessarily the homes of wealth, is the importance of harmonious and reposeful surroundings appreciated, and only those who realize that in the selection of furniture which is to occupy a place in the home, intelligent care and thought are necessary. A modest home may be as tastefully, if not as expensively furnished as one in which a professional artistic decorator and furnisher has had carte blanch.

Much of the better designed and made furniture of today will be valued by future generations quite as much as are the pieces which have descended from Colonial times to their present owners. Hence if the purchasers of furniture of today desire that their memory shall be kept green, and their personal belongings cherished by their children's children, they must realize that the considerations of first importance are utility, beauty and permanence, and that the initial cost is of slight consequence.

THE CLASS PROJECT IN DESIGN—III

Edward J. Lake, Professor of Art and Design, University of Illinois

THE DEVICE OF UNITS.

THE DESIGN of initials, monograms, bosses, panels, borders, etc., to be used for the enrichment of objects made by industrial art classes, are in themselves problems that require the same careful adjustment as the objects to which they are applied.

With a poster, book cover, garment or piece of furniture on which such units may be used, the device of these units becomes interesting and practical. Balance, rhythm and harmony are necessary to the parts of a design as well as to the completed design.

Appreciation for "beauty of propriety," which every teacher of design hopes to develop, cannot be developed by spending all of the brief, precious time of the school year on two or three designs that may be executed in actual materials. Exercises in design must be given which will call the judgment of effects into constant application. The results of a few such exercises are illustrated.

Balance comes first as the element of all design that must be secured. The balance of several shapes to make a unit of attractive form is an exercise that leads to the discovery of other effects, such as rhythm and harmony. .

The designs shown are made of shapes cut from thin black paper mounted on a white card, or shapes drawn in outline and painted in with black ink. Squared paper may be used to secure symmetry in the adjustment of shapes, as well as in the device of the shapes themselves.

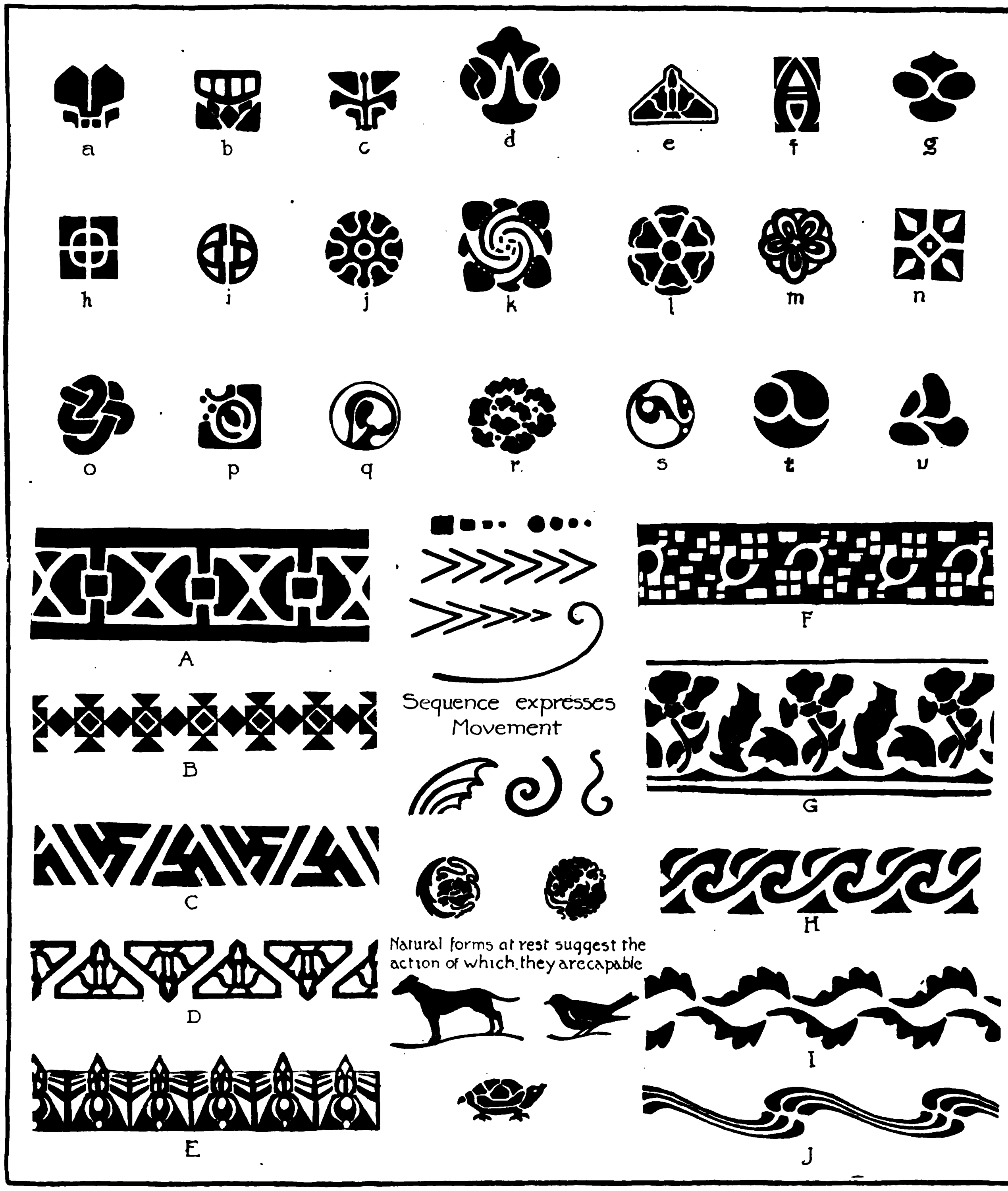
Single inversion over a vertical axis, as in a, b, c, d, e, f, and g gives a pleasing, orderly effect, but is not fine in result unless the white and black shapes are in suitable quantity, size and form. The tendency of beginners in design is toward elaborate effects and too little consideration of the space relations. The background areas must be made interesting and important as well as the imposed shapes.

Double inversion, as in h, i, j, l, n, gives more formal results and restricts the movement of the design by opposition in relation to two axes in place of one. Comparison between those units that are in symmetry over an axis with those that are in double inversion over two axes convinces the designer that the more orderly restraint that is put on forms in design, the more formal and fixed the design becomes. Mere order which holds the parts of a design under restriction, is dignified and severe, but becomes tiresome unless the forms themselves are especially interesting or well interrelated.

A radial unit, as j, l, or m, is held in restraint by relation to a common center. In j the action is outward from the center; in l the action is from the outside toward the center.

Units h, i, and n are related to the horizontal and vertical axes and are alike, tho reversed in the four quarters.

Units o, p, q, r, s, t, u are not symmetrical over the horizontal or vertical axes. They are held in least formal restraint, but are balanced by a careful adjustment of rhythm. If they are composed of interesting forms, so related that they hold together by reaction on one another, the unit will be pleasing. In o the unit is held together by interlacing, as a loose-knot or braided band is held together. In p balance is secured by the enclosure on two sides and related spots and curves. Notice how the inner curve reacts against the



EXAMPLES OF UNIT DEVICES WORKED OUT IN THE AUTHOR'S CLASSES.

enclosing angle and yet conforms to the shape of the enclosing angle. Units q and s are enclosed circles that hold in easy restraint forms that have common curves.

It should be observed that rhythm is a most interesting effect in design—which may be expressive of a great variety of kinds of movement from the slow formal movement that results from symmetry and radiation, to the graceful and even violent action of abrupt change in direction, measure, interval or tone.

Sequence is a certain method of securing movement in composition. A series of spots of decreasing size gives the impression of movement from large to small. So, also, does the decreasing size between converging lines direct or index the interest. Again, in a sequence of curve, as in the plume or growing plant, the action is graceful, forceful or abrupt in degree with the change of curvature. Those natural forms that are most beautiful and interesting have this element of rhythm that is controlled by sequence. The wing, the volute and the spiral are recognized examples of controlled and orderly sequence.

The forms of animals and birds express the movement of which they are capable, even when they are at rest. The swift running animal or the swift flying bird is designed for rapid motion. This should be noted as a matter of interest and suggestion in teaching design. The growth of plants is significant to the designer. The great variety of forms in nature have their peculiar motion which conveys a definite impression. These effects have become common to the student, but should be recalled as material for the composition of effects in design.

Bands, borders, crests and fringes are devised by the repetition of single units in two directions. If the units are rhythmical in one direction, the repeated unit will be rhythmical in that direction. Alternation of two units of different size or form gives a variety of interest that results in a halting rhythm.

The borders a, b, c, d are composed of rectangular and triangular shapes which hold each other in restraint. Rhythm is especially evident in the diagonal lines and edges. E is a crest with a dominant rhythm upward, suggesting transition from one field of design to another.

Borders f, g, h, i, j are less formal because composed of units that suggest motion. They are arranged in order of increased rhythm. G undulates with a slow, heavy movement. F dances along with a vibrant action. H moves forward with strong, vigorous force. I is more rapid, and j is leaping with long, graceful strides.

The beauty of these effects depends on their application. The designer must learn to choose effects that are suitable to the desired purpose, but the designer must observe effects of various sorts and learn to devise them in order to make intelligent application to purpose.

THE NEED OF TRAINING

Homer J. Smith, Assistant Professor of Industrial Education
The University of Minnesota

SUMMER always brings to teachers increased opportunities for study and for association with those of similar interests. The summer population of the training institutions increases steadily and a marked change has been noted in recent years on the part of industrial and vocational teachers toward this avenue to professional improvement. Those charged with the direction of training have seen to it that the offering is more diversified and definite so that one may no longer plead the school's failure to touch his vital interests. All may now be sure of return.

We believe that ultimate success in a profession and the time necessary to attain one's greatest usefulness in it are dependent in large measure upon his initial training for the work. The lawyer, the physician, or the engineer who attracts the attention of his fellows is very often known to have been early well grounded in the principles basic to the field. It is appreciated that he rises rapidly thru ability to study cases in practice and to make adaptations to new conditions without losing sight of fundamental truths and aims. If we will, for the moment, disregard the influence of native ability and personal attractiveness on teaching success, we shall doubtless admit that those in our own profession who enjoy high praise and first distinction in rank and salary are those whose preparation was strong and, likewise, who make surface changes compatible with deep convictions.

Self-satisfaction is not a condition to progress. We must be uncomfortable to be progressive. We must take precaution to keep from the ruts or by-lanes, and the best means to be truly fortified is to know the last determinations of our foremost research men, administrators, and students of method. To read the general and specific literatures of education is good but it is always in unfavorable comparison with attendance upon classes. We need to hear and to take part in discussions of new movements under leadership of those who can conduct them with respect to established policies. We note a returning summer after summer to the institutions of training and an increasing ardor on the part of the "repeaters." Many who never matriculate succumb to an awe of the institution or labor under the assumption that nothing of consequence is to be had. Some have been discouraged by lack of entrance qualifications but need no longer delay for this reason. Colleges now admit *adult specials* who work for certificates if not for graduation and it is hoped that the time will soon be when skilled craftsmen will be examined and given a high fraction of credit in courses which the experiences have paralleled.

The purpose of the present writing is to present the advisableness of class attendance by all types of industrial teachers and especially by those who have entered the work directly from other vocations. The assimilation by the teaching fraternity of women and men trained for service in the industries has been a great problem and we have made much progress. We have perhaps gone farther toward a solution than we would have done in attempting the reverse situation, i. e., the fitting of the skilled teacher into the most difficult service called for from engineers, or pattern-markers, or milliners. To transfer one's interest from production to the intangible results expected from schools is to attempt no easy task. There is too great a gap.

In the factory things are made after specifications; the product can be handled, checked with the plans,

changed, and, if need be, scrapped. The finished piece can be followed to its destination and watched in its functioning. If error is found to exist no greater harm will result perhaps than the loss of a job by the workman or of decreased patronage for the employer. Unworthy or incompetent effort means loss of dollars or vexing delay and occasionally injury and death. In the school, on the contrary, we have no definite specifications. Our products are unmeasurable in the last analysis. We cannot "throw out" and forget the percentage of spoiled pieces; neither can the materials work back to the raw and come thru again for better handling. We have only begun to follow school output to its destination and to test its functioning. Almost nothing has been accomplished in readjustment to life's demands, once the trained youths have left our hands. In cases of error the workman, the teacher, seldom suffers and officials cannot well be held to account. Competition is not sufficiently forceful; there is little apparent use to check. The misfit alone suffers in that he is underdeveloped or prepared for a condition that he does not meet. The result is loss of reward and interest and happiness, in most cases forever. Who will say that the cases are parallel? Who cannot see that the productive industry and our profession are fundamentally different? Preparation for the shop task does not necessarily fit one for classroom service and it may really unfit him, for some habits and attitudes will need to be lived down before more desirable ones can take their places.

I would not be misunderstood, I do not oppose continuance of the step we have taken. I would not bar the artisan from our ranks. We need him. We shall need more of his kind as the work develops. We may find it proper to limit the range of his service to the technical courses of the senior high school, the trade-training institution, the evening school, and the part-time class. I am sure any such tendency will receive his own endorsement and support. We shall surely need a greater number of "artisan-teachers" but may be content with a decreasing ratio thru a narrowed field of work. The movement in question has been a good one, is older than many suppose, was augmented by the war, progresses now, and seems likely to continue. We ask only for more educational preparation and more professional training. We want to encourage improvement-while-in-service and to do it not by the inducement of higher salaries alone but by a logical presentation of the real reasons why training is important. Those immediately concerned should be pleased to have the question dealt with concretely and those who direct may find here what will call out more constructive and sympathetic help. Administration work may have so robbed our minds of concern for improvement in teaching that many people of promise have even now been lost. The fact that so large a number of trade instructors show real aptitude for teaching and skill in it, in the absence of training, should urge us to keep a man and to develop every trait that he possesses which fits the professional requirement.

What are the requisites of good teaching? In what way do the practices of shop life tend to train toward or away from good teaching? What major difficulties are faced by those making the change? What methods of improvement are most favorable? What standards of professionalism need most to be called to the beginner's attention? These are the questions which need to be answered in detail and with candor.

A teacher must know the subject matter to be presented. Just here a tradesman meets our requirements admirably for his experience has been a steady accumulation of facts and skills in the trade and of knowledge of the various ways of accomplishing the same task, with their comparative results. He possesses first-hand, reliable information in a setting so practical that his usefulness to groups soon to enter industry cannot be denied. If there is any possible chance of his not being prepared as to subject content it is because he has over-specialized, is not generally grounded in the vocation. The number of such men and women in a given community is apt to be large but few will apply for school work and some of these will be refused. We have few places for the vocational specialist.

A teacher must be acquainted with the nature of youthful minds. He must be able to recognize individual differences and capacities. Is the artisan so equipped? Perhaps not, and he is not to blame. He may have worked where the product was constant, where each man turned out the grade of work which the employer found it to his advantage to produce. Regardless of his ability to do better work he had to do the common job. Unmindful of the abilities of the men at benches and machines a foreman exacted a product, unvarying in material, in exactness of form, in finish, while he called for a rate not too far from average. Such conditions are not met with in the classroom and he who has worked long under them is to some extent unfitted for teaching. Students must be studied as individuals differing in native ability, in their subject interests, in ages and sizes, and in the purposes for which they have enrolled. Our aims are to develop their full powers and to avoid studiously what may thwart their unfolding or seek to hold any to the level of the group. We do not seek a common performance. Run to its limits, our business is to make people different because they are primarily different and because school work should bring forward what lies all but dead.

Again, the teacher must realize that young people, all of us for that matter, are but machines after all, so constituted that they react in certain precise ways to situations met. He must know that there are definite laws of learning which it is only economy for him to understand. He must be aware of the tendencies inherent in those he instructs and that it is his business to bring out some of these tendencies, to stifle others, and to modify still others so that the consequent actions

will be for the good of the student and of those about him. These facts lie in the field of educational psychology which the teacher trained in an institution is more apt to have studied and more sure to keep in mind as he does his work. In the knowledge of human nature the artisan seems not to meet the standard of his mates and should do what he can to build an interest in this fascinating and necessary science.

In addition to familiarity with usable subject matter and the knowledge of the laws of learning, the teacher must be versatile in methods and class management. He must be able to see student types and be appreciative enough of varying needs to know that a given course outline, however long it may have taken to devise it, is not suitable for several classes. He must be skilled in group study and in the preparation of courses to fit conditions as he finds them. He needs to know the various types of lessons and which one is most happily chosen in a given instance or how they may be merged. He needs to have some ideas about discipline beyond the hire-and-fire order to which shop service has accustomed him. He ought to be able to point out errors, with the reasons for them and to motivate better work, forsaking his inclination to have the student stand aghast or smiling while he himself gives perfection to the piece. He must learn that school tasks are in sequence, not isolated as they come in life, each to be done in the quickest and best way which suggests itself. He will do well to wean himself from the desire to make a showing and to urge himself continually to stress ideals in work and in conduct toward it. He must realize that we train not for the youth's first job but so that no work of his choice may ever be denied him. We are obligated to send out ready and hopeful young men and women—ready because they have not been fitted to a known groove and hopeful because self-assured thru a variety of preparation.

And there are also the extra-class activities—a general helpfulness about the building as regards cleanliness and quiet—the cooperative relationship with parents and employers and fellow workers—the understanding of supervision and the wish to make it pay—the service of guidance—the expected assistance in athletics and music and program organizations. In these things the vocational teacher has not felt his full responsibility nor has he known the return experienced by those who enter them with enthusiasm for success and to inspire cooperation.

It is a big work we are in, a true profession. We must know the business details of it and cultivate its ideals. Reading helps greatly; visiting days have proved of value; conventions should not be missed; committee work should be accepted; correspondence study has been the making of the thousands. But the present plea is for continued attendance upon classes. It is pleasurable and highly essential that one get into the atmosphere of teaching to examine the new in relation to the old, to sense the difficulties of others in the field, to keep abreast of the broadening conceptions of our work. Every man of us should be identified in some way with an institution of training.

EDUCATIONAL GUIDANCE

Charles A. Wardner, Vocational Director, Jackson, Michigan

THE word "vocational" has so long been applied almost exclusively to industrial and trade occupations, that it has ceased to convey to the average mind the broad meaning which it should have. Therefore, many educators, especially those of the old school, view with alarm the rising movement for vocational guidance and placement. Many of these educators received their early training in the little old red schoolhouse of our forefathers.

Many of these educators having struggled on thru school and college amidst great difficulties, chiefly financial, realize how very few of the children entering school ever get to the college and higher education. To them the college seems to be the chief aim in school life, and, as Dr. Davenport suggests, they are trying to make a trunk line railroad out of the school system and railroad all students into college. As a matter of fact, 98 per cent of them drop out by the wayside and into the past, like chunks of coal from a train, and it is largely a matter of chance what becomes of them.

The movement for vocational guidance and placement sprang up to provide places for these human chunks of coal and direct each one down the proper coal-chute of life or up the right conveyor.

Later we began to see that it was often too late to help a child very much if we waited until circumstances caused the child to leave school and seek employment. A noted person once said, "If you are going to do anything for the average man you must do it before he gets to be a man."

The modern vocational director is striving to prevent the pendulum from swinging too far in either direction and is honestly trying to help each child fit himself for whatever calling seems to fit his particular case and in which he will find the greatest amount of happiness and usefulness to his fellowman. This means that the child needs assistance in selecting the proper course of study and subjects within the curriculum.

Therefore, with all this in mind, we have in the Jackson public schools a department called "Educational Guidance." The following is a brief outline of the ground work upon which we are attempting to build the department.

General Plan of Educational Guidance.

I. *Analysis of the situation.*

A. Vocational guidance in its broad sense, is a continuous process and depends for its success upon the child, the teacher, the home, and the community.

B. No one person is great enough and broad enough to look into the future and select a vocation for any child.

C. The child must be stimulated and guided into making his own choice of future occupation thru:

1. Self-analysis.
2. Personal data.
3. Counselors' advice.
4. Occupational information.

D. The teacher must be genuinely interested and willing to give the subject careful thought. Teachers should understand the child's home life.

E. By the time a child finishes intermediate school he should not only have a strong desire to go on thru high school, but should know definitely what studies he should take up in high school.

II. *Aim.*

1. To stimulate self-analysis on the part of each pupil and develop especially every tendency and interest that may affect the choice of a lifework.

2. To increase the child's vocational information thru English, history, and mathematics classes; later thru life-career classes and a direct study of all local occupations.

3. To study each child's personality, ability, and natural tendencies thru the child's school work and the result of mental and manual tests and measurements.

4. To instill enthusiasm into every child and a desire to learn because of the power and ability to meet new situations derived from applied knowledge.

5. To make prevocational work an important part of the intermediate schools, and vocational work a part of the high school curriculum.

6. To guide intelligently each child in the choice of curriculum and electives within the curriculum, with a view to his probable future vocation.

7. To stimulate each child into intellectual activity and vital interest in school work; so much so that the whole plan of education will take on new meaning and become a pleasure, impelling the child constantly to desire more education, and therefore to stay in school as long as possible.

8. To develop the power of each child to the highest plane of personal efficiency in order that he may fill his place in the world according to his talents and with the greatest degree of personal enjoyment and service to his fellow men.

III. *Method.*

1. Self-analysis of each child thru the use of a questionnaire designed chiefly to stimulate thought on the part of the child, also for direct information. The child must be led to discover his own capacities, aptitudes, and interests.

2. Study of the character and conditions of occupational life and surveys of local trades and industries, also the professions.

(a) Thru English and other classes. Visiting or reading about certain occupations and using the impression and information obtained as themes for essays.

(b) Talks to the class by the teacher or others interested.

(c) Survey by each child of certain selected occupations.

3. Mental and educational measurements of each child.

(a) By a selected method of mental tests.

(b) By a suitable measure of manual dexterity.

4. Forming of life career classes in ninth grade or high school.

5. Leading each child to an intelligent vocational decision himself and the proper selection of studies. Effort must be made to retain children in school as long as possible and to place them in occupations only when necessity forces such action.

IV. *Machinery.*

1. The special work of preparing the child's mind for successful educational guidance must be done by:

A. The regular teachers.

(a) English teachers, thru English composition, oral discussion or debates.

(b) History teachers by short talks or lessons showing how earlier generations chose occupations and developed individual talents.

(c) Mathematics teachers by pointing out the significance of different phases of mathematics in the various callings.

B. The special teachers.

(a) Industrial arts, agriculture, and commercial teachers by making their work prevocational and showing its relation to out-of-school occupations.

(b) Household arts teachers by talks on the various vocations growing out of housework and that greatest of all vocations for women, home making.

C. Principals by talks to groups or the entire school on occupational subjects.

D. The vocational director by talks to students and thru assisting in measurements and tests.

E. Persons from outside of school who may be induced to give short talks on their respective occupations.

F. The child himself who must be made to see that education is largely a matter of personal effort.

2. The home room teachers are to have charge of the educational guidance of the children in their rooms, and keep the records pertaining thereto.

3. Other teachers will be assigned by the principal to assist home room teachers who have charge of the large study rooms, each such teacher being given a group of not to exceed 50 children for guidance purposes.

4. Each child is, if possible, to be under the guidance of the same advisor thruout his seventh and eighth grade course. When he passes into the ninth grade, his guidance records will be sent to his ninth grade advisor and will follow him on thru the high school.

5. Guidance of the child in the choosing of his elective studies for the following semester will be based upon:

(a) His personality and school record.

(b) The data given on his questionnaire and record cards.

(c) The ideas and wishes of the child and of his parents.

(d) Careful consideration of other conditioning factors that will occur to the teacher.

6. The selection of every elective study must have behind it a good and sufficient reason, and should not be based upon popularity of instructor, reputed ease of work, or similar notions in the mind of the child.

7. The principal will assist in different cases by advice to the teacher and personal conferences with the children.

The director of educational guidance will have general oversight of the planning and carrying on of the work, and give help and counsel in individual cases as needed.

V. *Some general considerations.*

1. Educational guidance will supplement the home in giving much needed wise counsel and advice to the child at a critical time in his life, the beginning of the adolescent period. This may be accomplished by

(a) The regular teachers in daily contact with students.

(b) The vocational director in personal talks and interviews.

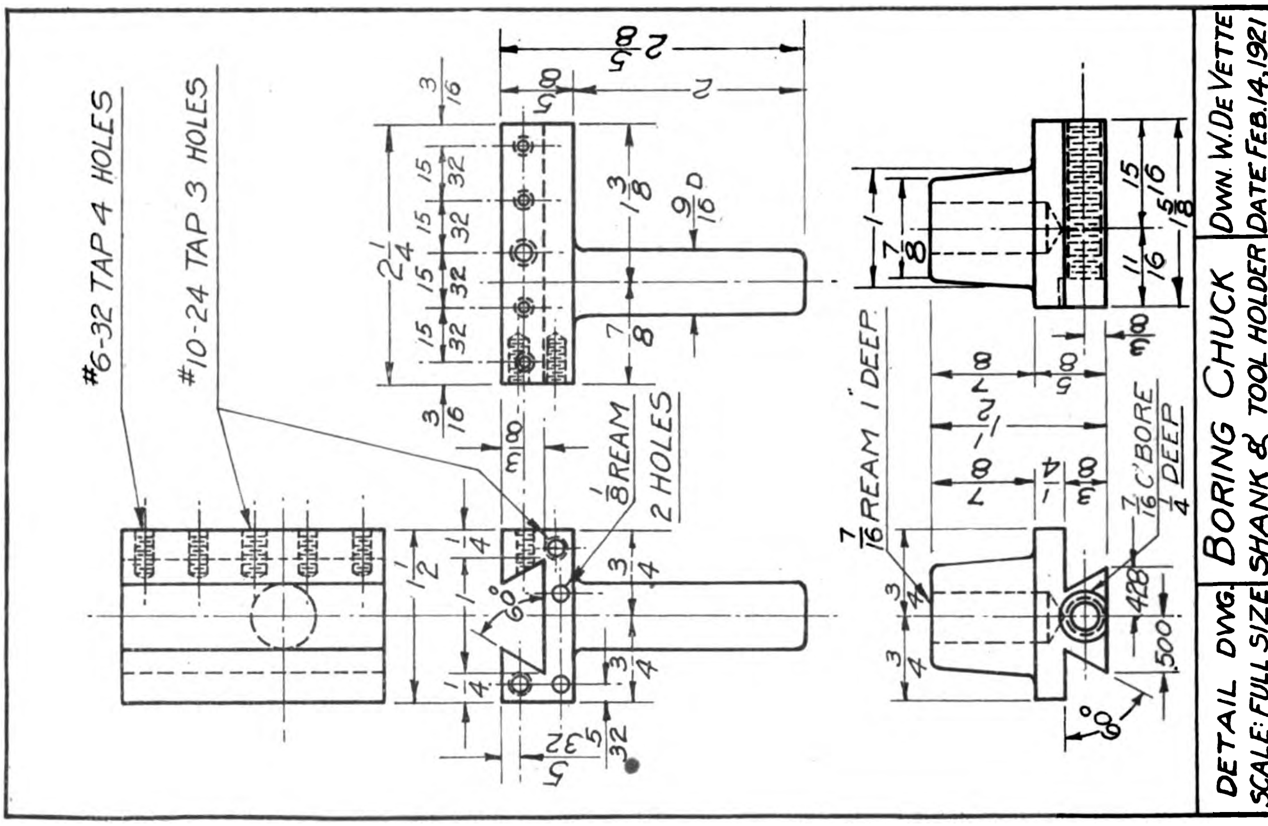
(c) Interview by appointment with some professional or businessman who is a member of an advisory board.

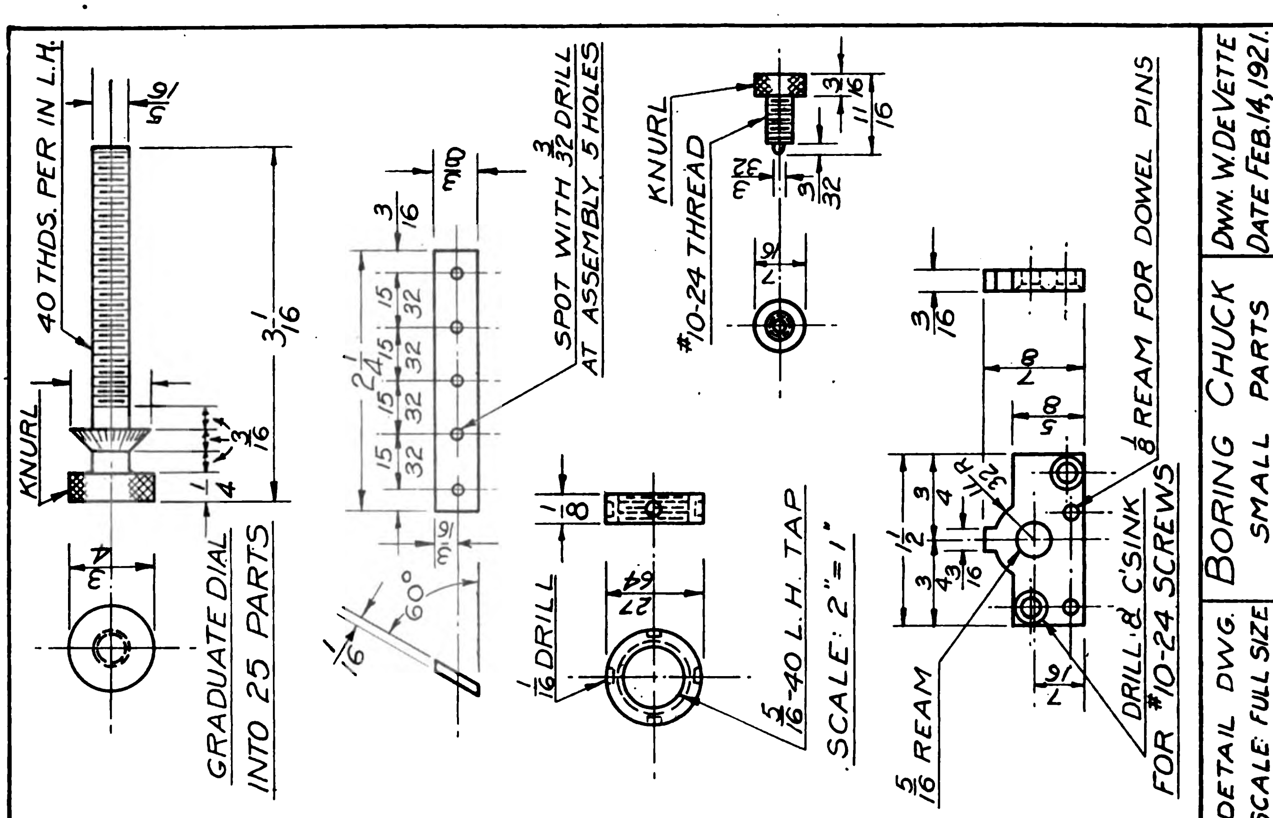
2. Educational guidance offers a rich field for teaching the individual child his relations and duties to society and the state by giving him loftier ideals, better standards of living, and making him a happier citizen.

3. Many children develop a disloyal attitude towards school and an antagonism toward authority which can be entirely changed by getting him into the right course of study, and giving him a definite aim in life.

4. Educational guidance is a continuous process and requires a combination of private work and classwork together with the counselling and followup work.

5. During the time of prevailing high wages many children were prematurely drawn into industries away from the school. A closer relationship between the school, the home, and the business world will tend to correct this evil.

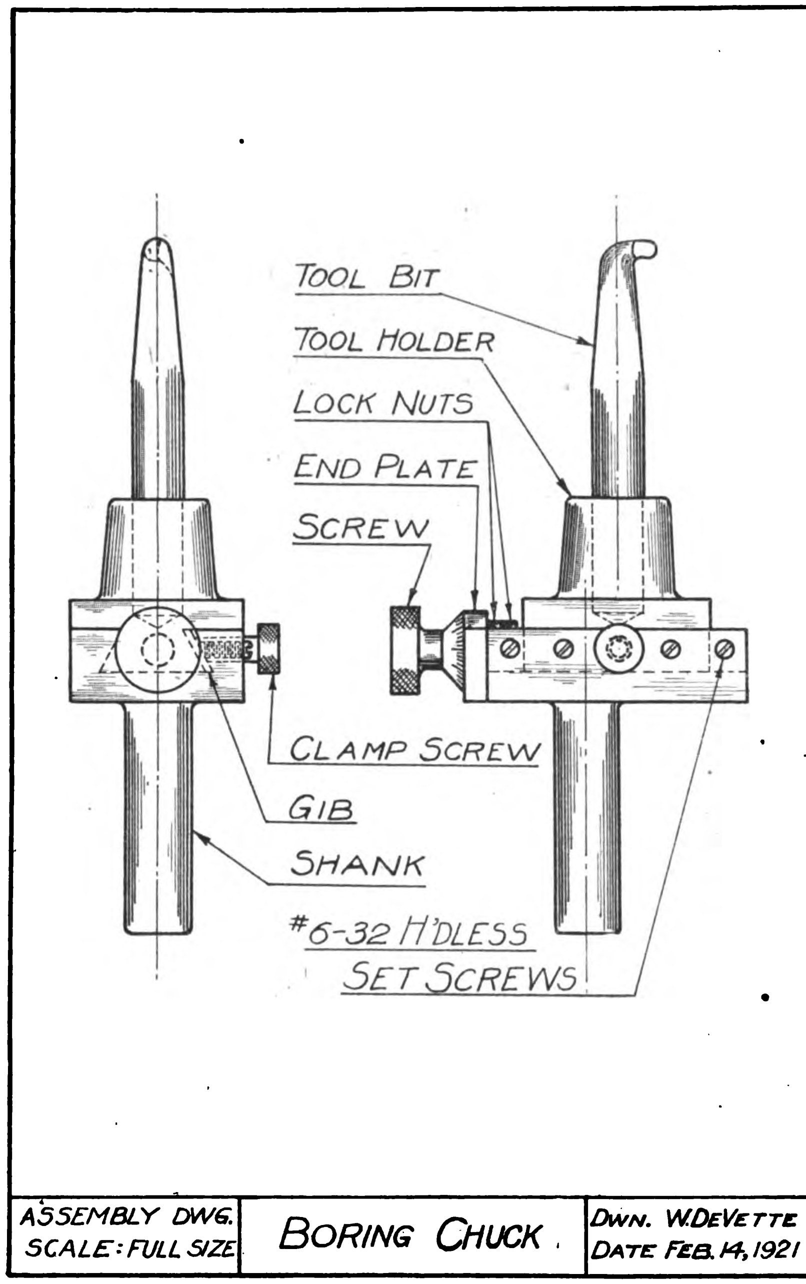




SMALL BORING CHUCK

William A. De Vette, Erie, Pa.

THE small boring chuck is the one tool which the machinist, the toolmaker, and even the instructor very seldom has until he takes the time to make one for his own use. In the accompanying drawings I wish to present a chuck which can be given to advanced students in machine shop practice as a shop project and which would be of unusual interest to the students themselves for the reason that they all know they shall need one almost as soon as they leave the school for the commercial shop.



The boring chuck shown in these drawings is so designed as to be very simply and easily constructed by the student, the main parts being the shank with its dovetail slot and the tool holder with its dovetail. The screw with the exception of graduating the dial is a lathe job entirely and the gib is straight.

In designing this chuck especial care has been taken to insure rigidity and consequent accuracy in operation by a dovetail with a gib adjustment for the slide.

The screw has forty threads per inch so that if the dial is graduated into twenty-five parts there will be .001 movement per graduation.

The minimum size of the hole which may be bored with this chuck is limited only by the size of the tool itself which is able to get into it. The dial is in a very open position so that it may be easily read and adjusted. The adjustment is made by loosening the screw at the side, turning the large screw the required number of graduations, corresponding to the thousandths of an inch to be removed at the next cut and then again tightening the small screw at the side. This will insure against all possible movement or backlash of the slide, or tool holder.

If the student's course were so arranged that he could make the drawings for this chuck himself it would aid greatly in familiarizing him with the points of its design before he attempted to commence its actual construction.

A PLAN FOR DESIGNATING PUPILS.

Mr. T. W. McNeill, Instructor of Manual Training at Keyser, W. Va., has worked out a plan for designating students where they come from both the grades and the high school. For every class Mr. McNeill makes out a list somewhat as follows:

Time of recitation..........

Name	Student's No.
Adams, Elmer	1-7-A

The first number in the series indicates the bench where the pupil works. The second number indicates the grade in which the student is enrolled. The letter indicates the class in manual training to which the boy belongs. High school students are indicated by substituting for the second number a letter to show the class to which they belong. Thus F represents freshman, S, sophomore, J, junior, and Z, senior.

The Pine Apple Door, Concord, Mass.

PENCIL SKETCHING

Harry W. Jacobs, Director, Art Education, Buffalo, N. Y.

Part III.

THE first article on pencil sketching was devoted to the materials used and the manner of their handling. Strokes of various character were considered, followed in the second article by the discussion of a general plan of working from the simple parts of a subject, to the completed sketch, applying such fundamental principles as were considered in the first article.

In this article, we will consider the center of interest as an important factor in picture making, as applied tc pencil sketching.

As one selects a subject for a sketch, he will practically always find a confusing amount of detail, but within all this detail there is some one chief interest point, which his eye will return to again and again for satisfaction. Our problem is first to select this chief interest point and then to be able, thru study and experimenting with the pencil as a medium, to give a general effect of the detail which surrounds the selected interest point. This is accomplished thru the arrangement of masses and lines which will tend to suggest detail. This pattern of masses and lines will always be subordinated to the interest point, yet be a most important factor in building about our focus point, arrangements, that will lead the eye to this center.

A subject may be composed of many parts, as a gateway, stone steps, building, foliage, fence, road and figures, but these put together upon paper, do not make a picture; and not, indeed, until they have been arranged and composed.

There is no doubt that the finder, a small piece of cardboard, with a rectangular opening cut of good proportions will be of great assistance in finding your picture and determining your interest point. This finder is moved about, until within the opening, framed by the cardboard, is a pattern of line and mass, with a focal center. The camera also offers a view finder, thru which we may arrange the setting of our picture, making a pleasing composition.

In selecting the subject of a sketch, the draughtsman's interest is attracted first by the general setting of the subject; then his interest becomes fixed in one direction, in fact, toward some particular object in the whole subject. Should this subject be of too great proportions to come completely within his focus, he selects some particular part of the whole, which he desires to emphasize as a central interest point in his sketch.

For example, in the three sketches of "The Postern Gate of Moret," three different interest points have been emphasized. In "A," the interest centers about the arch of the gateway, with its dark shadow and silhouetted people against the lighter value of the water. All details are subordinated to this center and all lines and masses are so arranged as to lead the eye to this point.

In "B" the interest is in the upper part of the gateway, all other detail being subordinated. The rough roof, the wall made of hundreds of small stones cemeted in place with the heavy cornerstones as main supports make for interesting pattern.

In "C" the interest is centered to the left of the archway, the doorway of the gatekeeper's house, the big stone gateway being suggested to complete the idea of the home and its connection.

Every sketch involves the selection of a viewpoint, the determination of a center of interest, the location of that center of interest on your paper so as to form a pleasing arrangement, and the adjustment of all lines, values and masses to make evident, to emphasize, to exalt, that center of interest which is the real subject of the sketch.

This may be accomplished in several ways; by placing the center of interest near the center of the picture; by making the lines and masses of such a character as will lead the eye toward the center of interest; by subordinating all masses and lines as they go away from the interest point; by accenting and accentuating all detail at the interest center; and by giving the greatest contrasts of light and dark at the center of interest.

In the sketch of the "Corner Grocery" made in the shadow of Christ Church, Boston, when Paul Revere hung his signal lanterns, I tried to think of a series of zones—by taking a compass and inscribing an imaginery circle with the center of the doorway as a center and the dark of the doorway as a radius. This zone was the center of interest. The next circle or zone inscribed would be to the edge of the barrel, taking in all subordinated masses, while the third circle or zone would extend to the edge of the awnings which would find all masses breaking into line. In other words, our values radiate from the center outward, from dark to light and from mass to line, each zone controlling a value from light to dark and all zones enhancing the central interest point of our sketch.

Every draughtsman must pick and choose and group, thru considerable study, the elements which the sketch is composed of, that the result may be beautiful.

Nature is not always to be taken as she is, but must be continually transferred and moved about that the best compositions will result. The tree may be taller, the dark foliage moved nearer the light colored house to gain the contact desired; the foreground will be transferred into a pattern of lights and darks, removing this and adding that, all enhancing our interest point and rounding out our sketch.

Every sketch must offer an invitation to enter into

A

B

it, some sketches greet you a long way off, by the contrast and arrangement of values. One feels obliged to stop and acknowledge their cordiality. Some admit you thru the side door, and into others you have to climb over a barrier or a lot of useless detail which, ofttimes conceals the central motive and the admirably rendered quality of the sketch.

The sketch of the doorway with the naturalistic treatment of the pineapple finial is a quaint variation from the familiar stiff and strictly conventional Georgian version. This sketch was made at Concord, Massachusetts, which offers wonderful possibilities as a sketching ground with its quaint houses of revolutionary period, its marsh lands and river, with the most beautiful trees and foliage.

With the coming of summer, everyone has a particular hobby, fishing, tramping, boating, etc. But have you ever gone a-sketching? Wandering about in your vacation, carry a pad and pencil. Your material will always be at hand. You will always come upon

C

Photograph of the Old Corner Grocery, North Square, Boston.

the interesting doorway with its purple shadows; the house on the side of the hill with its patches of rock and flowers; the quaint old ship; the old gateway with its excellent bent iron work; and the shaded street with patches of sunlight weaving a wonderful pattern before you. As Hopkinson Smith remarks in his wonderful book on "Outdoor Sketching"—"There are no bounds to the joy of the painter whose north light is the sky, whose studio door is never shut, and who often works surrounded by envious throngs, that treat him with such marked reverence that they whisper one to another for fear of disturbing him."

It is with the greatest interest that you look back over the past year's sketches of the various incidents and happenings, the record that you have made of interesting subjects. With this summer's sketch book, I earnestly hope that you will gain added interest thru these articles and that that interest will lead in each case to the "center of interest" of each sketch.

We are now so unaccustomed to beauty that we are apt to look upon it as a luxury, and to regard with suspicion those who talk of art; and indeed I began by admitting that much that passes by the name is sheer waste and foolishness. But the art with which we are concerned is nothing more than an intelligent mastery in work done; it is the element of quality in workmanship.—*W. R. Lethaby.*

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

TIME FOR SHOP COURSES.

The purpose of a shop course is *accomplishment.* The nature of it is *activity.* One test of it, *especially from the pupil's point of view,* is *production* in some form. But accomplishment, activity, and production absolutely require *time.* What a failure we invite, therefore, if we introduce courses which demand these fundamentals and then limit the time allowance to a maximum which makes any teacher's success impossible!

Satisfactory shopwork cannot be done in a part-time school in thirty or forty minutes a week. This work differs from other work. It requires preliminary arrangements, preparations of a routine character at each recitation. It takes some time to close up a recitation in shopwork so that the shop may be left ready for the next class. Hence, by the time we deduct the time for opening the work and closing the recitation, there is but little time left for actual constructive activities.

From our point of view, less than two periods a week in a part-time school shop is not only wasted but the very impossibility of accomplishing anything in less time creates a distaste and a dissatisfaction among the pupils. It would seem better to devote no time at all to shopwork than to waste one period of thirty or forty minutes a week in a sort of make-believe shopwork where nothing can be accomplished. Especially is this so among those boys who show neither aptitude nor interest. If the elective plan, which seems so desirable, is properly used, this would seem to eliminate from a particular shop those who show no aptitude or interest.

At any rate, if boys are permitted or required to take shopwork in the part-time school, they should have such a time allowance as would not foredoom the efforts of both teacher and pupils to complete and hopeless failure.

WIDE HORIZONS.

We are reminded of a prophecy which a well meaning friend made to the editors of The Industrial Arts Magazine in its infancy, "The industrial arts is a fine subject for temporary educational discussion and promotion, but the subject will soon be covered and you will run out of material for publication."

The Industrial Arts Magazine is now publishing its tenth volume. Contributions are coming in faster than they can be published and the subject of industrial arts has grown to such proportions in our schools that the editorial problem is one of careful selection to cover a constantly increasing variety of interests.

Our friend was a prophet without vision. Few prophets of educational development have adequate vision. Indeed! It is a bold educator who will risk his reputation by prophecy. Better far to express a conviction of principle upon which speculation may be based than to commit oneself by rash prophecy. We have an abiding faith in the necessity of industrial education and industrial art. That faith is upheld as the years go by so that we are firm in the belief that our problem of promoting the industrial arts in education is a task of vast importance and responsibility which can be performed only by the most generous cooperation of all concerned.

WASTE AND WEALTH.

They say that our free public school system and our democratic form of government are in the experimental stage. Some of our schools are threatened with bankruptcy because of the enormous increase in operating expense. In some communities the schools have reached a point where the limit of taxation has failed to keep the schools in effective condition, and increasing deficits demand that more money be raised.

Most great cooperative undertakings have had periods of depression. Remedy has usually been brought about by better management and more cooperation. It is decided that both our democracy and our schools have reached a point where waste must be reduced to a minimum. It may also be conceded that greater cooperation between wealth and education will find a way to promote education as the only way to promote democracy.

Waste in education is caused by inefficient teachers and indifferent pupils. We surmise that large numbers of boys and girls are going to school as a matter of aimlessly sharing in the birthright of a democracy to which they recognize no obligation, and large numbers of teachers are holding positions for which they are unfitted in training or spirit. The obligation of the pupil to the nation will not be developed by emphasis on the propriety of passing thru a prescribed order of school exercises. Obligation carries with it the desire for service.

One remedy for the waste of aimlessness in school lies in the development of the school as a selective agency. The capacities of pupils may be determined by careful tests. School work should be as carefully applied by the school, according to the capacity of the pupil, as medical aid is applied to physical condition. This is becoming possible as we are learning to apply educational and intelligence tests.

But the substitution of selected instruction for aimless instruction will not cost less in dollars. It will probably cost more. The money for it must be supplied from the only source of wealth. Those who are able must pay the bills. Democracy requires that her citizens have equal chance to develop according to their capacities. Democracy must be generous with the

privileges of service to those who can foot the bills. It should be the privilege of wealth in a wealthy community to foot the school bills in a poor community. State and Federal aid for education have been held up as bogies against democracy, but who is afraid of bogies when education, the very foundation of democracy, is threatened?

OVER-DOING THE OUTLINE, LESSON PLAN, AND RECORDS BUSINESS.

Recently, a teacher of shop work was exhibiting to a visitor the merits of a wonderful new system of lesson blanks, class records, individual reports, etc., etc., which he had worked out. It seemed that no item of procedure, time, material, purpose, result and "things hoped for" had failed to receive its little allotment of space. He had even constructed a beautiful little cabinet in which to keep the elaborate system of which he was so proud.

Then the visitor asked a simple little question, as visitors will do. "And how does your system work in the practical conduct of a class?" "Oh," said the teacher, "I haven't tried it; I am simply too blamed busy to use it!"

The teacher hardly seemed to appreciate the irony of the fact that he had worked out a scheme that would require a private secretary to keep it going. Elaborate pieces of machinery have been known to fly to pieces or to collapse in a useless mass by the sheer force of their own weight and complexity.

Blanks and records and reports and plans and outlines have their places, but when they become so numerous as to occupy a large percentage of the time of both the students and the teachers, they become nothing short of a nuisance. A few simple and brief devices of this kind help to clarify and vitalize the work; but when they constitute almost the sole reliance of the teacher, they become a routine drudgery which crushes the life out of the work.

ART IN THE PART-TIME SCHOOL.

We have looked almost in vain for suggestions as to how art instruction may function in the part-time school. We have noted with some chagrin the quite common disposition to ignore the art work in planning the curriculums for the working boys and girls.

Perhaps no one knows just what should or can be done with the art work in the part-time schools. In this respect, then, it is about on a par with a number of other subjects. Certain it is that the common emphasis on execution cannot meet the needs of this type of school, with its rapidly changing, temporary pupils.

But cannot something be done in the way of appreciation courses that will make the boys and girls more valuable workers and more intelligent, discriminating consumers and home makers? Cannot something be done to make the part-time boys and girls conscious of the fact that the principles of art and design are involved in practically everything they buy, everything they sell, everything they make, everything they wear, everything they eat, and in large measure everything they think? The principles are there whether in observance or in violation. We think they can be made vital, controlling factors in these pupils' lives, if only teachers of vision can get down to their levels and deal in the common, everyday language with the principles of art and design as they affect the common, everyday things in the lives and the environments of the working boys and girls.

This new field presents an opportunity and throws out a challenge to ambitious teachers of art. Let us hope that there are those who will take up the challenge, grasp the opportunity, and do the work that so much needs to be done for the part-time schools.

Influence is the worst handicap any young man can have. It tends to make him feel he need not exert himself to his full capacity and has a bad effect upon him. When other workmen learn that one of their number has a pull with somebody higher up, they look at him askance and the effect upon these other men is bad. Then the foreman, or whoever is over him, will either show him undue favors and push him into a position for which he is not fitted, or, if the boss is of a different stamp, he will hesitate to promote him even when he deserves it because the boss knows the others will think it is a case of favoritism. The effect, therefore, is bad upon the whole organization. When any young engineer or college graduate or anybody else comes to me asking for a letter to enable him to get a job at our works I say to him just what I have said here.—*John D. Ryan.*

Beautiful homes will never result from the assiduous painting of flowers in our school classes. Neither will beautiful homes result from extensive "picture study," as it is called. Pictures have just about as much to do with making our homes beautiful as have books. It is desirable that we know something about the great painters and sculptors of the world, for the same reason that we wish to know something about Shakespeare and Dante. But one might be very familiar with the contents of the great Art galleries of Europe, and still know very little about how to make his home beautiful.—*Hugo B. Froehlich.*

Because of its vital part now, and its promise of still greater prominence in human affairs the production and use of printing offer a challenge for achievement.

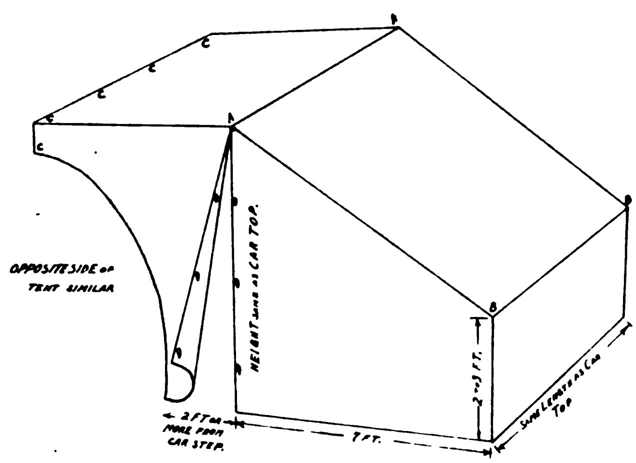
The printer who loves his art, and is zealous for accomplishment, must have a background on the standards of master production. He must endeavor to employ in his own work the sound principles and vast fund of precedents open to him. The multiplicity of present-day requirements, and the almost unlimited range of material, make knowledge and skill imperative for those who would be masters in the Master Art of Typography. —*Henry Lewis Johnson.*

CAMPING WITH AN AUTOMOBILE

Leon A. Orr, Supervisor of Industrial Arts, Burlington, Vt.

For people with a car and limited means there is no way of enjoying one's vacation so much and so economically as to take that car and go on a camping trip. Go anywhere, to the mountains for scenery, fresh air and a change of vision, or to the cities and historical places for the benefits which are to be derived from such associations. We, a party of four, traveled for eleven days in a Ford during which time we covered eleven hundred miles at an expense of fifteen dollars a person. This included two nights at a hotel, or six dollars per night, but did not cover the wear on the car or tire expense.

AUTOMOBILE TENT.



Pole supports at A.A. and B.B. to which rope stays are fastened. C.C.C. ropes fastening to car on opposite side. D.D.D. auto curtain fasteners. At lower corners peg to ground.

The main requisites for such a trip are a tent and cots, both preferably home made, and a camp stove to burn gas generated from gasoline under pressure.

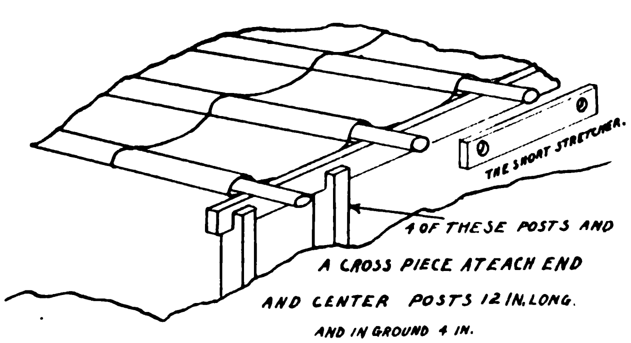
The tent should be one beginning at the top of the car, as wide as the top is long and extending out eight or nine feet. (See the accompanying drawing for particulars.) The whole should be waterproofed with a coating made of one box of paraffine melted and diluted with three times as much gasoline and should be applied quickly with a paint brush before it cools. The poles can be made of bamboo or other light wood in two sections.

The cot is easily made from strips of canvas sewed together, 7 by 7 or 8 feet. (See drawing.) Other strips are sewed on, to take poles as supports, the ends being kept off the ground by posts and cross pieces.

The stove may cost more than a grate under which to build a fire, but on rainy days or with a scarcity of wood it will more than repay its cost. It is surprising what little room this outfit takes up on a running board and how little it is noticed when covered with black oil cloth.

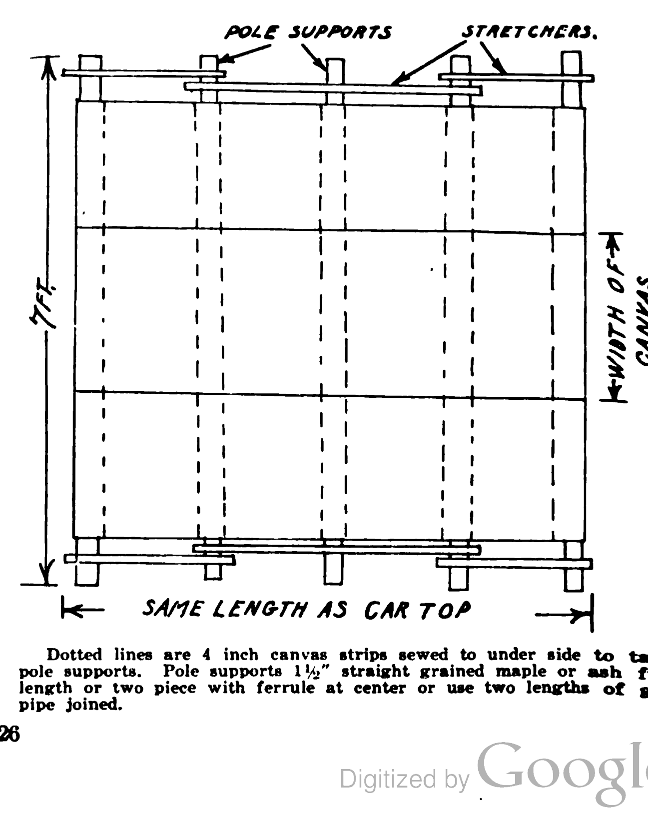
The special trip I spoke of led from Albany, N. Y., thru New York City and Philadelphia to Washington and into Virginia, returning by way of Gettysburg and the Delaware Water Gap. The first night's camp was on the outskirts of Tarrytown in the romantic Sleepy Hollow region and was in an open pasture across the road from Andrew Carnegie's estate. The next night was at a rural schoolhouse in New Jersey. School yards are ideal places, free from long grass and of easy access to the road, and unless posted one need feel no fear of trespassing. If posted, get permission or move on. Once we were ordered off by one party after gaining permission from another, but when explanations were made all was well and we were informed that it would be "a right smart place to camp all right."

Some times we camped with other parties. One night it was a couple from Montana, another night a couple from Ohio and a party of five from western Pennsylvania. Across the Potomac from Washington, on the road to Mt. Vernon and almost within sight of the capitol there is an ideal camping place. Here we spent two nights with a party from Florida.



Cot and method of supports. Lower view is minus the stretchers, one of which is shown.

THE COT.



Dotted lines are 4 inch canvas strips sewed to under side to take pole supports. Pole supports 1½" straight grained maple or ash full length or two piece with ferrule at center or use two lengths of gas pipe joined.

The quaint Pennsylvania Dutch towns were very picturesque and pleasing. One very rainy night was spent at a two-hundred-year old hotel in Gauglersville among the quaintest of the Dutch where a pail was a "bucket" and a faucet a "spigot" and the cook stoves of the homes were shut up in cupboards to make living rooms of the kitchens.

In fact, many and varied are the sensations and experiences encountered and everyone is willing to meet you half way if approached carefully and pleasantly and as a fellow being in their own sphere of life. In fact, we had offers to use front and side lawns as camping grounds and one neighbor, on a Sunday, baked a pan of biscuits for us.

In conclusion, do not hurry yourselves to death. An average of a hunded miles a day is sufficient if you would see everything. Lay up over Sunday and rest for a new start. Stop for a swim in a lake or to catch some fish and you will return home refreshed and rested and intent on another trip as soon as possible.

TRADE COURSES IN OKLAHOMA.

Henry F. Holtzclaw, Supervisor, Trade and Industrial Education.

Since the year 1903 the Oklahoma Agricultural and Mechanical College at Stillwater, has offered four-year courses of college rank to those desiring to specialize in some line of vocational education.

Realizing the need of offering training of less than college grade in the trades and industries and thru the aid of state and federal funds the college now offers practical trade courses in automobile mechanics, cabinet making, carpentry and machine shop practice.

At the present time 34 students are enrolled in the two-year course in automobile mechanics and nine are enrolled in the two-year course in machine shop practice. These courses are less than college grade and are open to boys over 14 years of age who are at least eighth grade graduates.

The courses are practical and the graduates are to be awarded certificates recommending the holder thereof to any employer with the statement that he has completed the two-year course in automobile mechanics and machine shop work and expressing the opinion that the graduate, after reasonable experience, will become a skilled and efficient workman. Each student enrolled in the courses given, is required to work sixteen hours per week in the shops, six hours per week in applied science, four hours per week in mechanical drawing and in addition to this instruction, to take one elective course in either English, physical education or citizenship. In the first-year courses the elective is generally a physical education, and in the second year courses, English and citizenship is recommended.

The entire engineering plant of the College, including mechanical, civil, chemical and architectural engineering departments, is available for the students enrolled in the trades and industrial courses. Forge and machine shops, woodworking shops, the college power plant and the well equipped mechanical and electrical laboratories offer a rare opportunity for study.

The College owns a well equipped garage and among the equipment is six automobiles and twelve automobile engines. The students not only take down and assemble automobiles, repair broken parts, and study the various theories of design, but are also skilled in magneto, starting, ignition, lighting, carburetor adjustment and study of soldering, brazing and oxy-acetylene.

Students in machine shop practice are required to make drawings of machines, both detailed and assembled, the use of the lathe, shaper and planer, tool-making, involving the use of milling machines and grinders and the heat treatment of steel in annealing and casehardening. The manufacturing of one hundred and fifty nut crackers, several glue presses and turning lathes for woodwork served as productive projects used to give practical training in machine shop work during the first semester course which ended January, 1921.

MAKE YOUR INDUSTRIAL-ARTS MAGAZINE ONE HUNDRED PER CENT EFFICIENT.

Harold J. Van Westrienen, Royal Oak, Mich.

I have been a reader of the INDUSTRIAL-ARTS MAGAZINE for the past three or four years, and although I have been receiving many helpful suggestions, I realized that after their being read and laid away the copies at once lost their usefulness. After considerable thought on the question of cataloging the material for future reference work, I decided on the following plan.

My first step was to divide the topics under different heads, so as to enable me to locate the desired information with the least possible effort. This I did after assembling, sorting, and eliminating all possibilities. The list I submit may be altered to suit the individual needs of the reader, but the following covers nearly all the material contained in the magazine and I find it very efficient.

1. Automobiles (courses of study, repair, etc.).
2. Baskets and weaving.
3. Book binding and paper work.
4. Cloths, weaving and leather work.
5. Clay modeling and pottery.
6. Concrete work.
7. Commercial lettering and sign painting.
8. Electrical apparatus, telegraph, etc.
9. Machine shop and forge shops.
10. Metal work (art and sheet).
11. Mechanical drawing teaching kinks.
12. Pattern making and foundry.
13. Printing.

Wood Work Projects:

14. Involving squaring stock.
15. Involving squaring and chamfering.
16. Involving squaring, chamfering and boring.
17. Involving half-lap joints.
18. Involving mortise and tenon joints.
19. Involving coping saw work.
20. Involving turning saw work.
21. Tables and benches.
22. Cabinets (sewing, cooking and filing).
23. Farm woodwork.
24. Athletic apparatus.
25. Wood turning.
26. Wood finishing.
27. Teaching woodwork (kinks and jigs).
28. General topics along educational lines.

As the reader finds a worth while article it should be recorded at once under the proper heading, for example as follows:

24. ATHLETIC APPARATUS.			
TOPIC	PAGE	MONTH	YEAR
Playground Slide	320	August	1918
Toboggan	453	November	1920
Etc.			

27. TEACHING WOODWORK, KINKS & JIGS			
TOPIC	PAGE	MONTH	YEAR
Course in 1st Eight Grades	1	January	1919
Makeshift Jig Saw	287	July	1919
Points on Wood Joints	15	January	1920
Etc.			

By recording all valuable material in the above manner in a notebook form, a wealth of valuable information is at hand for instant reference, while hours could be spent in vain looking for the desired material under the old "Throw on the Shelf" method.

The time required to keep this catalog up to date is very small, and well repaid by the value received in future reference. Bind your numbers in yearly volumes, catalog them, and make your copies of the INDUSTRIAL-ARTS MAGAZINE one hundred per cent efficient.

VOCATIONAL EDUCATION IN THE GARMENT TRADES AT LOS ANGELES.

"Maquina de coser, sewing machine. Obra, work. Vestido, dress." And then when Inez or Consuella or Francesca have done particularly good work the instructor says Bien hecho! Well done.

The Spanish words with English translations on the blackboard in the power sewing machine school in Los Angeles, California, are little lessons in Americanization which Mrs. W. S. Kienholtz, the vocational education teacher is giving her twenty pupils "between garments."

In July the schools and the garment manufacturers evolved a plan to teach hundreds of girls and women who need immediate employment a trade at which they may earn a decent living. The state laws of California require manufacturers and employers in every occupation to pay women workers a minimum wage of $16.50 a week. To make employes worth their wages is what the manufacturers wanted from the school and to make better citizens of the pupils in training is what the educational department of the city desired. The idea of putting together the demand and supply originated in the vocational department of the Chamber of Commerce which has an industrial department and a committee on vocational and educational affairs. In conference with W. S. Kienholtz, head of the Los Angeles' vocational training in the city schools the practical scheme for teaching women a trade in from two to eight weeks was effected thru the cooperation of schools, employers and the Chamber.

Over $800 was raised by the Associated Apparel Manufacturers to purchase 20 power sewing machines which are full almost every hour, altho the state school laws permit only a half day to be spent in vocational training. At the end of the course pupils are given a certificate of proficiency and permitted to seek employment. Over 100 pupils have been placed since July and over 200 have enrolled in the school. Employers are satisfied with the workers turned out and even take some of the pupils from the school before they have completed a full course, saying that they are willing to take them and pay wages while they are still apprentices.

Other employers have sent workers to the school on the promise that they should be re-employed at higher wages when they become more proficient.

Garments are supplied by clothing manufacturers for stitching and all the County Hospital clothing is sewed by the apprentices. Over 25,000 aprons, rompers, pajamas, kimonas, bloomers, surgeons' operating gowns, intern coats and shirts have been stitched in three months.

"The manufacturers are anxious to send their material because we have established a reputation for never spoiling things," Mrs. Kienholtz said proudly, as a messenger from a local concern entered the room with a pile of twelve dozen shirts, the second "batch" of goods brought within the month.

Mrs. Kienholtz' success with her pupils is due to her careful overseeing and her past experience as forewoman in a garment factory in Minneapolis. Her tact and good nature make the little Mexican girl sitting in the corner quite at ease in her strange new surroundings. Foreigners who are unfamiliar with factory regulations, which require clean hands and neat clothing for workers who expect to receive steady employment, are told in Spanish words the meaning of the American, the very American hygiene.

A VOCATIONAL CLASS IN A LOS ANGELES GARMENT SHOP.

When Juan comes to school with a bad cold Mrs. Kienholtz sends him home and tells him what the Americans do to cure bad colds.

Altho most of the pupils in the trade school are women, men occasionally apply for entrance. At present a young Italian barber is learning to become a tailor between shaves and the mother of a growing son is going to become a garment maker so that the boy can finish high school. Another woman, the mother of a baby girl and an invalid husband is going to keep the household out of the charity bureau because in two weeks she learned how to run a power sewing machine and is now earning over $25 a week in a dressmaker's establishment.

Beginners earn on the average $24 a week, but piece work sometimes brings in as much as $40 or $50 a week to experienced operatives, Mrs. Kienholtz says.

"This free school of course attracts all types. But of course we can't train everyone. We eliminate those who are too nervous or too set in their ways of basting and pinning and pinning and basting, because we know that an unadaptable dressmaker will never be able to make good in a factory," Mrs. Kienholtz explained as she sorted out piles of cut garments for stitching.

Some of the samples made by the forewoman of a factory are not 50 per cent as well made as the garments turned out by the pupils in training, employers and instructor all agree.

The painters of Los Angeles need skilled laborers and when they heard of the success of the garment making school one concern told the Chamber of Commerce that it would supply all the paints, brushes, buckets and wood for a master painters' school. Three times a night old hands as well as new apprentices at painting, gather in the public school to learn interior decorating, wood finishing or even English and some commercial subject taught by regular public school instructors.

Laundrymen have watched the progress of both schools and recently conferred with vocational education committeemen in the Chamber and the director of vocation training in the schools to see how the interests of employes in laundries and the employers can be better served thru formal instruction. In two weeks the largest laundry in Los Angeles will be turned into a school before working hours and after the regular business day.

This practical use of industrial plants and schools has been decided upon as the best course in establishing the trade school idea rather than building a million-dollar-plant for trade pupils alone, as has been suggested by a number of visionaries. But if the trade school idea progresses as rapidly as it bids fair to do, Los Angeles may be the site of the proposed temple of trade before the conservatives are convinced.

TRAINING OF APPRENTICE PLUMBERS IN ERIE, PA.

A working agreement on training of apprentices in public night schools has been signed by representatives of Erie Master Plumbers' Club and Local Union Number 333. By the terms of this agreement both employer and union require of all registered apprentices that they attend the classes in mathematics for plumbers and in sketching and plan reading which opened October 18.

This step is the direct outcome of a growing realization by union officials and employers of the duties they owe to the apprentices under their charge and to the public. Due to the modern development of the trade, apprentices may fail to acquire in their term of apprenticeship all the branches of the craft. Hence masters and men alike thought it desirable to set up such training as would make sure that each apprentice when he has completed his term of service would be able to render competent service as a journeyman.

To insure that the apprentices attend the instruction set up by the public night schools, the local union has ruled that no apprentice's quarterly card will be renewed unless he presents evidence of satisfactory attendance and progress at school. The working agreement entered into on September second, 1920, between the local union and the employers specifies in section 18 that the apprentice "must agree to attend night school classes for plumbing, that are to be arranged for by the school district of the City of Erie and by the journeymen and master plumbers of the same city."

The memorandum appended to this article was drawn up by E. W. Barry, business agent of Local No. 333, G. W. Butler, secretary of the Master Plumbers' Club, and E. L. Bowman, Director of Vocational Education for the city schools. It was at once adopted by the trade bodies and submitted to the school board for approval.

This form of agreement is contemplated by the Showalter Act of May 1, 1913, which provides (Section 3411, revised school laws of Pensylvania) that "local school boards may appoint an advisory committee composed of members representing local trades, industries, and occupations. It shall be the duty of such committee to counsel with and advise the local board of trustees and other school officials having the management and supervision of such schools."

It will be noted that the memorandum contemplated the gradual instruction of the work. The classes are open to journeymen as well as apprentices, and many journeymen are taking advantage of the work thus offered.

No texts were available for the classes. Mr. Frank Flowers instructor in plumbers' mathematics, has assisted Vocational Director E. L. Bowman in the preparation of a mimeographed text which thus far has met the needs of the men. Mr. G. Wesley Stickle, a local architect and instructor in sketching, is working out the details of a text in his subject.

Following is a copy of the memorandum:

Memorandum of Agreement for the Plumbers' Trade.

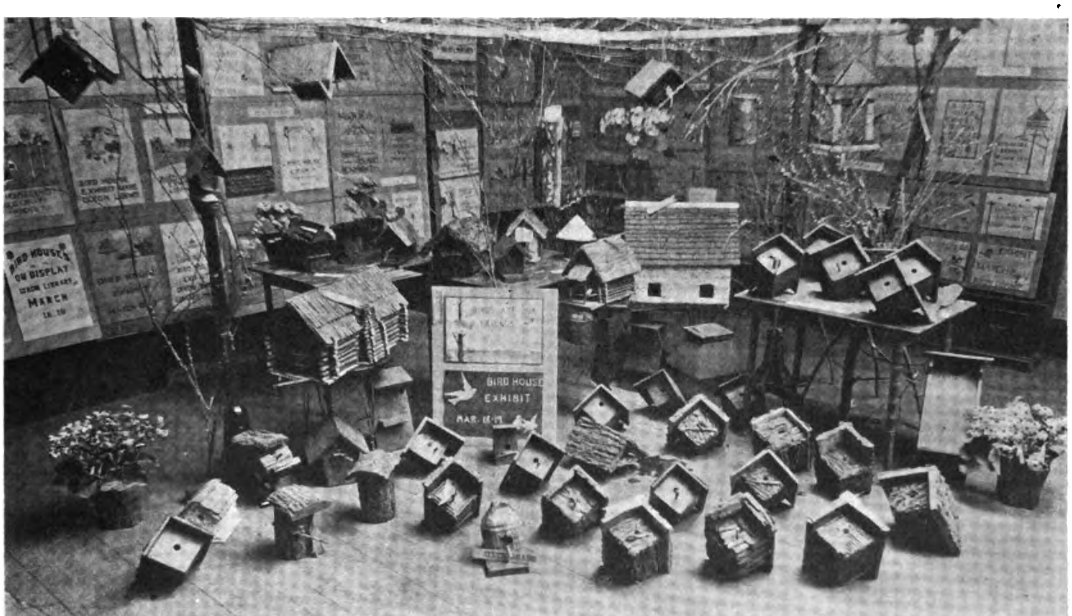
Memorandum of agreement covering courses for plumbers' apprentices and journeymen in the Erie Public Schools for the year 1920-21.

I. The School District of the City of Erie agrees:

1. That free evening classes will be opened to apprentice and journeymen plumbers as follows:

1920-21—

Mathematics for plumbers—one two-hour class.
Drafting for plumbers—one two-hour class.



BIRDHOUSE AND POSTER EXHIBIT, DIXON, ILL.

This is a portion of a birdhouse and poster exhibit of the Dixon, Illinois, schools, held at the Dixon public library, March 18-19. Local clubs and merchants contributed prizes in the form of bird books and other articles which boys would prize. A great deal of interest was manifested on the part of local people as well as on the parts of boys and girls. The picture includes only work of the sixth and seventh grades in manual training, under the direction of Mr. H. P. Stearns and Mr. Harry Phillips, and of the seventh and eighth grades in drawing under the direction of Miss Ella Kentner.

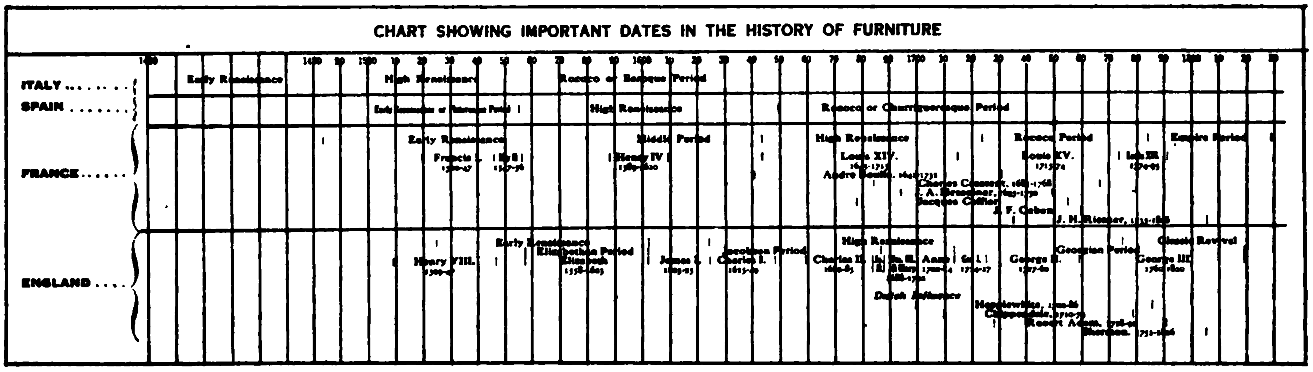


CHART OF DATES IN FURNITURE HISTORY. COMPILED BY THE PHILADELPHIA MUSEUM OF INDUSTRIAL ART.

1921-22—
- Advanced mathematics for plumbers.
- Advanced drafting of plumbing layouts.

1922-23—
- Principles of plumbing: practice and theory of sanitary plumbing—two hours
- Plumbing practice, shopwork instruction in parts of the trade in which insufficient practice occurs—two hours.

1923-24—
- Study of the plumbing code—two hours.
- Advanced shopwork in plumbing—two hours.

2. That the above designated classes will begin in October and will continue thruout the winter, for not less than 30 weeks of two nights each, provided the average attendance for any month does not fall below ten in any class.

3. That a certificate showing attendance and progress will be awarded students completing any short unit course in the above classes.

4. That the diploma of the evening schools in the plumbers' trade extension course will be awarded students completing the four-year course as outlined above, said diploma to be countersigned by the secretaries of the plumbers' local and the master plumbers' association.

5. That an advisory committee of two representatives of the master plumbers' association and two representatives of the plumbers' local will be appointed by the board of directors of the school district of the city of Erie from lists of not less than four nominations from each of the bodies mentioned. The director of vocational education shall be a member exofficio of this advisory committee.

6. That the school authorities aided by the advice and recommendations of the advisory committee will standardize the entrance requirements, equipment, course of study, methods of instruction, testing of students, etc., and the graduation of the pupils.

II. The Master Plumbers' Association of the city of Erie agree:

1. That they will nominate from their membership not less than four candidates for the advisory committee as specified in I, 5 above.

2. That no member of the association, after date of this agreement, indenture an apprentice unless said apprentice agrees to attend the trade extension classes outlined in I, 1 above, for not less than 80 per cent of the time such courses are open each year.

3. That no member of the association will continue to employ apprentices unless said apprentices attend the trade extension classes as outlined in Section I, 1 above, for not less than 80 per cent of the time the classes are open.

4. That the master plumbers' association and its members will give such assistance as is possible to the trade extension classes outlined in this agreement; that they will do everything in their power to assist in securing equipment and teaching materials.

III. The officers and members of the plumbers' local No. .. agree:

1. That they will nominate from their membership not less than four candidates for the advisory committee as specified in I, 5 above.

2. That they will require all apprentices registered with them to attend the trade extension classes outlined above for not less than 80 per cent of the time such classes are open, and will refuse to issue quarterly cards to all apprentices not attending classes as specified.

3. That the plumbers' local and its members will give such assistance as is possible to the trade extension classes outlined in this agreement; that they will do everything in their power to assist in securing equipment and teaching materials.

WESTERN ARTS ASSOCIATION.

The twenty-seventh meeting of the Western Arts Association held at Peoria, Illinois, May third to the seventh, was evident of a reviving interest in this organization which has sustained the Industrial Arts of the Central States.

A substantial program, an excellent exhibit and a fair registration marked the annual meeting as the beginning of a revival to pre-war strength and usefulness. The general sessions were held in the Assembly Hall of Bradley Institute.

The exhibits were displayed in the gymnasium building and represented work from important schools and cities of the country, arranged in attractive and convenient manner.

Outstanding features of the program were addresses on the Manual and Industrial Arts by Dr. C. A. Prosser, Director of Dunwoody Institute and discussion of the exhibits led by Dudley Crafts Watson, Director of the Milwaukee Art Institute.

Cincinnati was selected as the place of meeting for next year.

Carl T. Cotter, Director of Manual Training, Toledo, Ohio, was elected President; Mabel Williams, Supervisor of Art, Oak Park, Illinois, was elected vice-president; L. R. Abbott, Grand Rapids, Michigan, was re-elected secretary; Frances Masore, Boone, Iowa, was elected auditor; Ruth Raymond, Minneapolis, Minn., was made a member of the Council; S. J. Vaughn was appointed Chairman of the Council.

CONTINUATION TEACHERS HOLD MEETING.

United support of the work of the continuation schools by the judges charged with the enforcement of the compulsory attendance laws of New York City was pledged at the regular luncheon meeting of the Continuation Teachers' Association held on Saturday, April 9th, at the Cafe Boulevard. It was emphasized that united support of the work by the schools, the attendance bureau and the judges should work to the best interests of the pupils and prove a tremendous force for Americanization.

Mr. George H. Chatfield, assistant director of attendance, expressed the opinion that the schools and the attendance bureau are especially fortunate in the type of men on the bench who are responsible for the enforcement of the law.

Following Mr. Chatfield, Dr. Franklin J. Keller, president of the association, expressed the hearty appreciation which the teachers feel for the fine cooperation of the courts and the attendance bureau. He pointed out that it was the ideal of every teacher to make the continuation schools so valuable and attractive in the lives of young workers that the service of neither the courts nor the bureau will be necessary to bring them to school.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

TURNING PROBLEMS.

Emil F. Kronquist, Milwaukee, Wis.

Floor Lamps.

I find that the best way to start a piece of work of this nature is to ask the boy to look thru magazines, journals or newspapers, go to furniture stores to gather information about lamps, then to buy five cents' worth of wrapping paper in a hardware store and begin making the preliminary design full size. Boards from the lumber room are used as drawing boards. Care must be exercised in getting all proportions and shapes right and pleasing.

When the preliminary sketches have taken the right shape a finished drawing is made on a clean piece of paper, using a soft pencil and shading the drawing in order to set it off. "Crayola" is preferable to a soft pencil as it does not smear.

All the round lamps are designed with no portion longer than 36", that being the distance between centers of our lathes.

Before stock is glued up, rabbet out, or cut on circular saw, a groove about ½" square to take care of the wiring when finished. It is, of course, necessary to plug the ends of stock temporarily to provide centers while turning.

Drill holes necessary to assemble different parts of the lamp, fastening work in a horizontal position in the vise and have a fellow student watching at some distance to insure straight drilling. The base is turned on the outside screw of the lathe.

The lamps with octagonal sections are somewhat easier to make if care is taken in laying out the octagons in either ends from exact centers, then jointing to size.

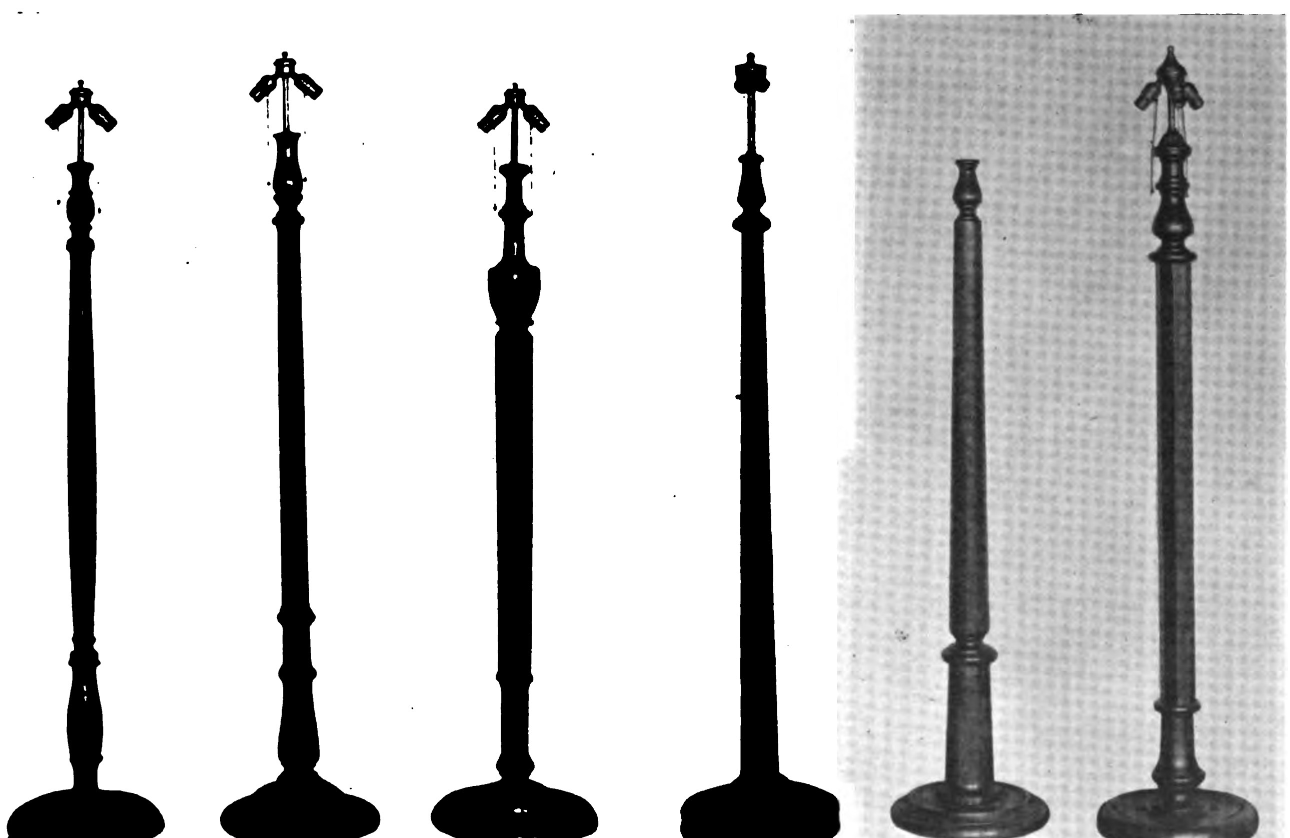
Finishing.

Most of the lamps were made either of gum or birch and finished in mahogany. We have had some splendid results by using mahogany acid stain on the birch, two coats of orange shellac, then two coats of varnish. Each coat was rubbed down with fine sandpaper or steel wool. If the latter is used, be very careful that all the small particles of steel are removed before the next coat is applied. The last coat of varnish should be rubbed down with pumice and oil for an egg shell finish; if a high gloss is wanted, use rotten stone and water followed by a furniture polish such as o'cedar oil or liquid veneer. For a mahogany finish on gum we have used an oil stain, allowing 24 hours before the first coat of shellac was applied.

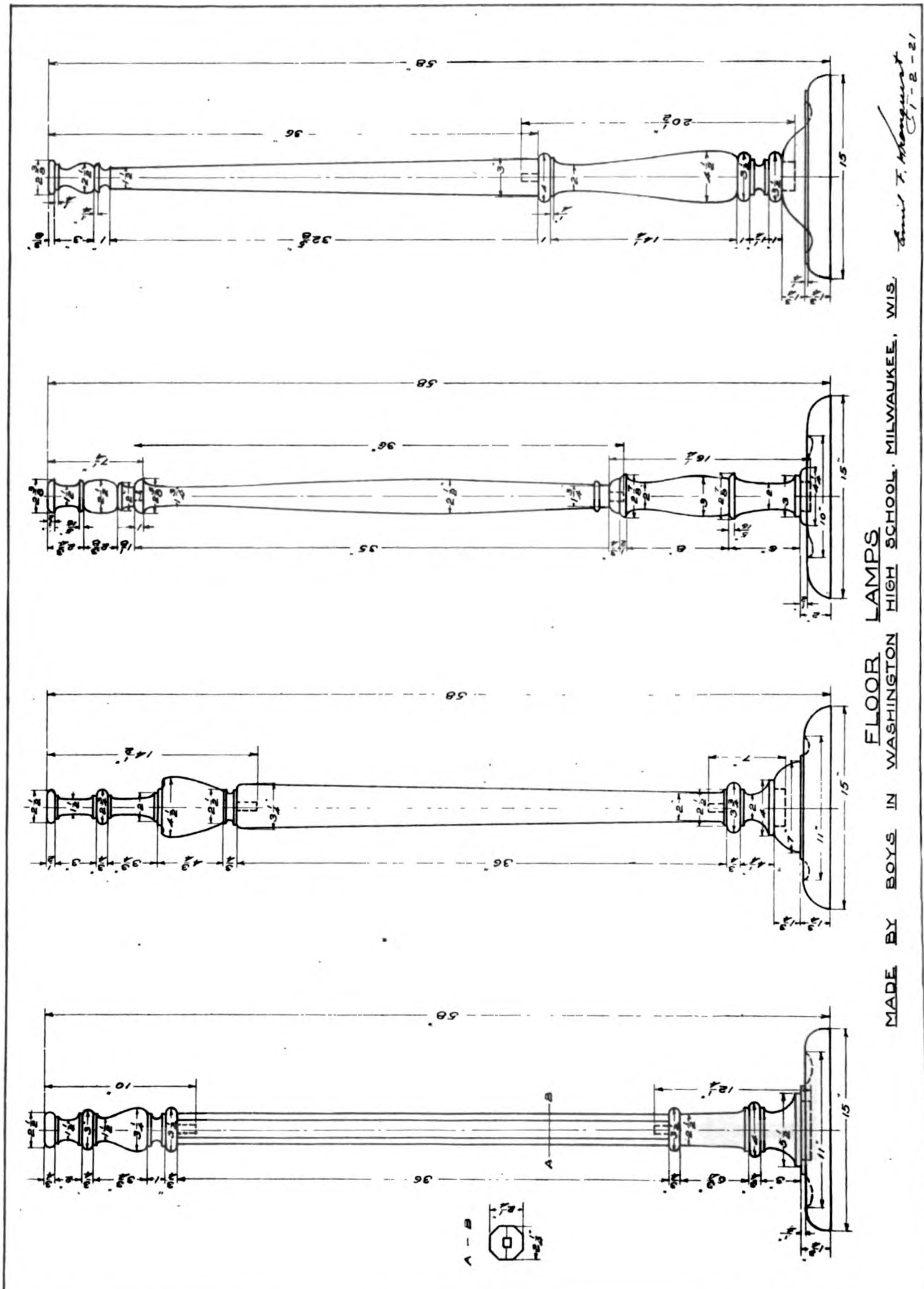
For a walnut finish on gum we do not think a better color can be had than the one gotten by Walter K. Schmidt's Standard Walnut water stain.

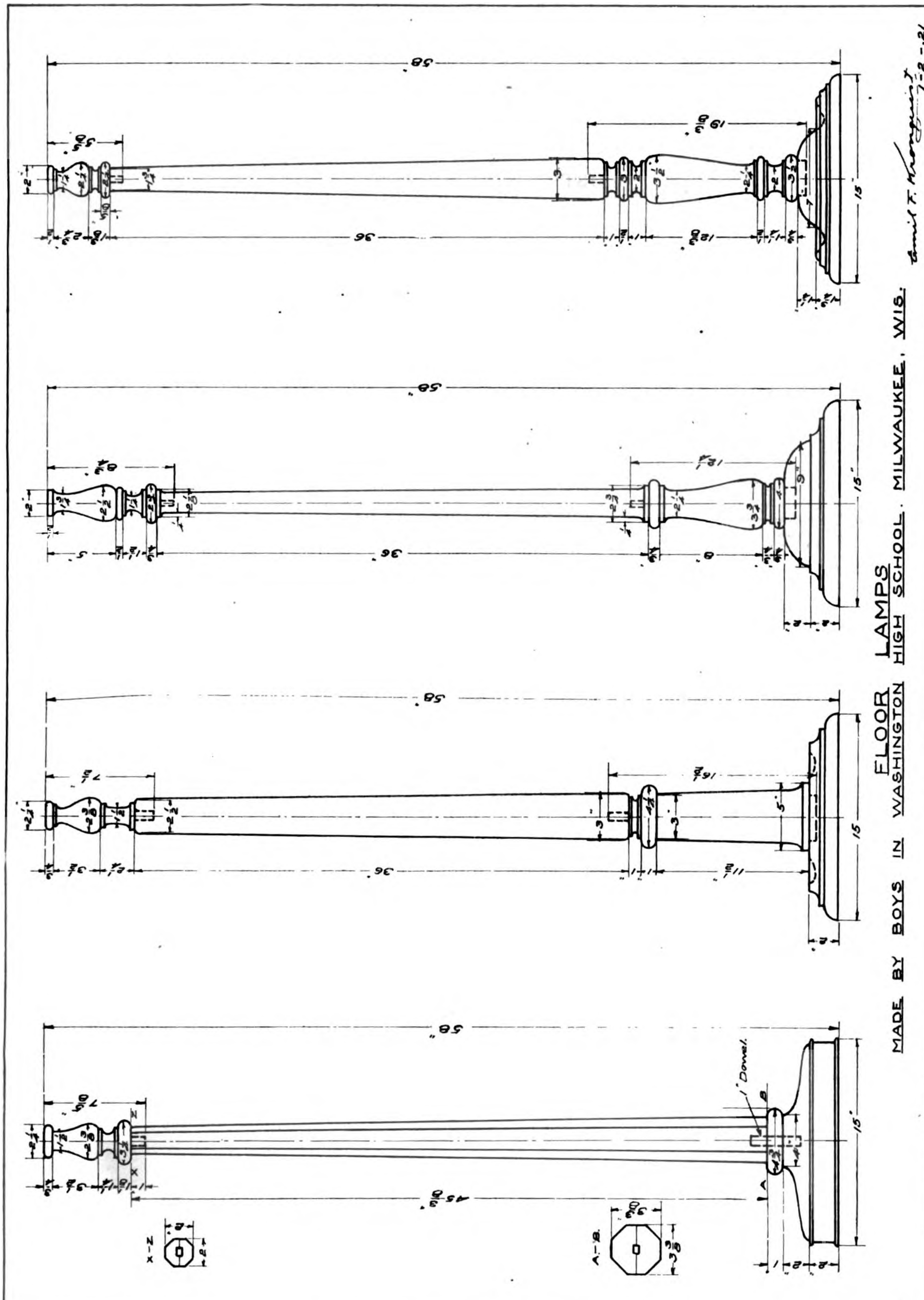
The lamps shown all require a shade of 28" diameter or larger.

The lamps mentioned were started at the beginning of the school year in September and all finished before the Christmas holidays, working 45 minutes each day. About one-fourth of the time was spent in making the drawing.



FLOOR LAMPS DESIGNED AND MADE BY THE AUTHOR'S STUDENTS AT THE WASHINGTON HIGH SCHOOL, MILWAUKEE, WIS.

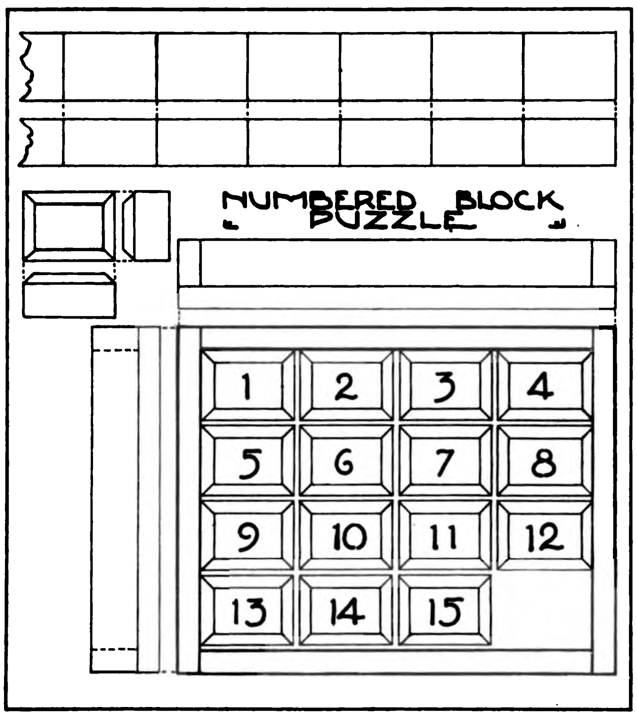

FLOOR LAMPS
MADE BY BOYS IN WASHINGTON HIGH SCHOOL, MILWAUKEE, WIS.


FLOOR LAMPS
MADE BY BOYS IN WASHINGTON HIGH SCHOOL, MILWAUKEE, WIS.
Emil F. Kronquist 7-2-21

NUMBERED BLOCK PUZZLE.

C. Edward Newell, Springfield, Mass.

Simple construction in wood, involving the repetition of the same or similar exercises will furnish a means of excellent hand training. Such training is to be had in making a numbered block puzzle. The sawing and sanding of the fifteen blocks gives training in the use of large muscles. Judgment must be exercised in sanding the bevels and a source of balance developed when locating and pasting the numerals in position. In order to train either classes or individuals in matters of judgment it is well to first prepare the fifteen blocks; place them in position; three rows of four blocks and one row of three blocks; measure the complete unit, calculate the amount of "play" needed around the blocks and decide what the



DETAILS OF BLOCK PUZZLE.

inside dimensions of the tray shall be. To this may be added the thickness of the rails, thus obtaining the outside dimensions of the tray.

The following materials are needed to make a number game; one piece of soft wood preferably pine or bass wood ¼"x3¾"x4¾"; one piece of wood ¼"x½"x18"; one piece of wood ½"x¾"x18"; twelve wire nails ⅜" No. 19; small consecutive numerals 1 to 15 each numeral about ½"x¾" in size.

The wood may be ordered from a mill or from a school shop. The clear stock may be procured from packing boxes as suggested in the article on the air plane is quite satisfactory. Wire nails should be purchased at the general store or hardware dealers in order to be sure of the size wire. The numerals may be set up and printed for this particular purpose in a school print shop or they may readily be procured from one discarded calendar page.

Numeral Blocks: Measure and saw the ½"x¾"x18" wood into 1" lengths. Use the miter box and back saw or a coping saw for this work. The former is preferable. Using about a No. 1½ sandpaper, sand each ½"x¾"x1" block on the ends and on four edges of one ¾"x1" face to make a ⅛", 45 degrees bevel. Cut the numerals into uniform size papers and paste one paper on the top of each block, long diameters of paper and blocks parallel. From among the blocks cut and sanded the best fifteen may be used for the game.

Tray: Measure and saw the 18" rail to make two pieces ¼"x½"x3¾" and two pieces ¼"x½"x4¼". On the floor for the tray, wood ¼"x3¾"x4¾" draw lines ¼" from and parallel to all four edges. Within each of these ¼" spaces place points for two nails, place ⅜" No. 19 nails on points and drive them part way thru the ¼" wood. Lay the floor on the ¼" edge of one 3¾" rail with long edges flush and ends even. Drive the nails part way into the rail, see that all is square and drive the two nails home. Nail the floor to the second 3¾" rail. Nail the floor to one 4¼" rail placed between the ends of the 3¾" rails. Nail the floor to the second 3¾" piece. Nail the ends of the 3¾" pieces to the ends of the 4¼" rails, one nail in each piece.

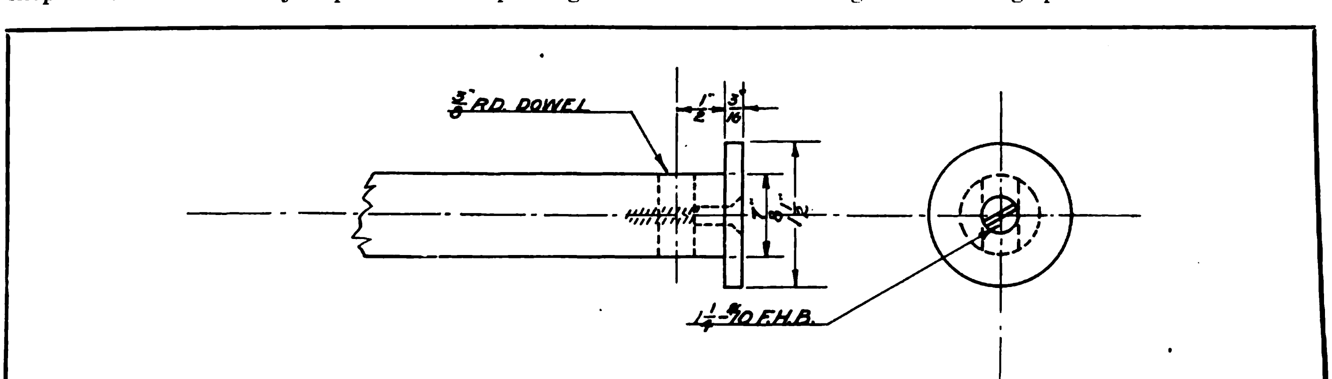
How to Play the Game: Fit the numeral blocks in the tray with the long diameters of the blocks parallel to the long diameter of the tray. A space for one block will be left vacant. Slide the blocks to the right or left, up or down in the tray to get them into consecutive order; 1, 2, 3, 4,—5, 6, 7, 8,—9, 10, 11, 12,—13, 14, 15. It is unfair to lift a block out of the tray. Since the numeral blocks are fitted into the tray in a different order at each game it is next to impossible to give any exact instructions for playing the game. It is a revival of a very old and amusing pastime, one that is quite absorbing and amusing for travelers, the lonesome, the convalescent and the stunt-loving youngster.

A VISE HANDLE HEAD.

A. R. Mitchell, Madison, Wis.

No school shop is complete without a set of first-class vises and a good vise requires a good handle. However, there are few shops that have a complete set of vise handles which are entirely satisfactory, unless the equipment includes vises with stationary iron handles.

My experience with vise handles led me to devise a head, as per sketch, which has proven very satisfactory, simple to make and lasting. The 1½" disks can be cut out of discarded belting (leather being preferable) or from the heaviest packing rubber used by steamfitters. These disks can be laid out with a pair of dividers and the holes for the screws bored before the disks are cut out to shape. They are easily cut with a sharp knife. The purpose of the dowel is to give a better "grip" for the screw threads.



DETAILS OF VISE HANDLE HEAD.

COMBINATION STEP-LADDER AND KITCHEN STOOL.

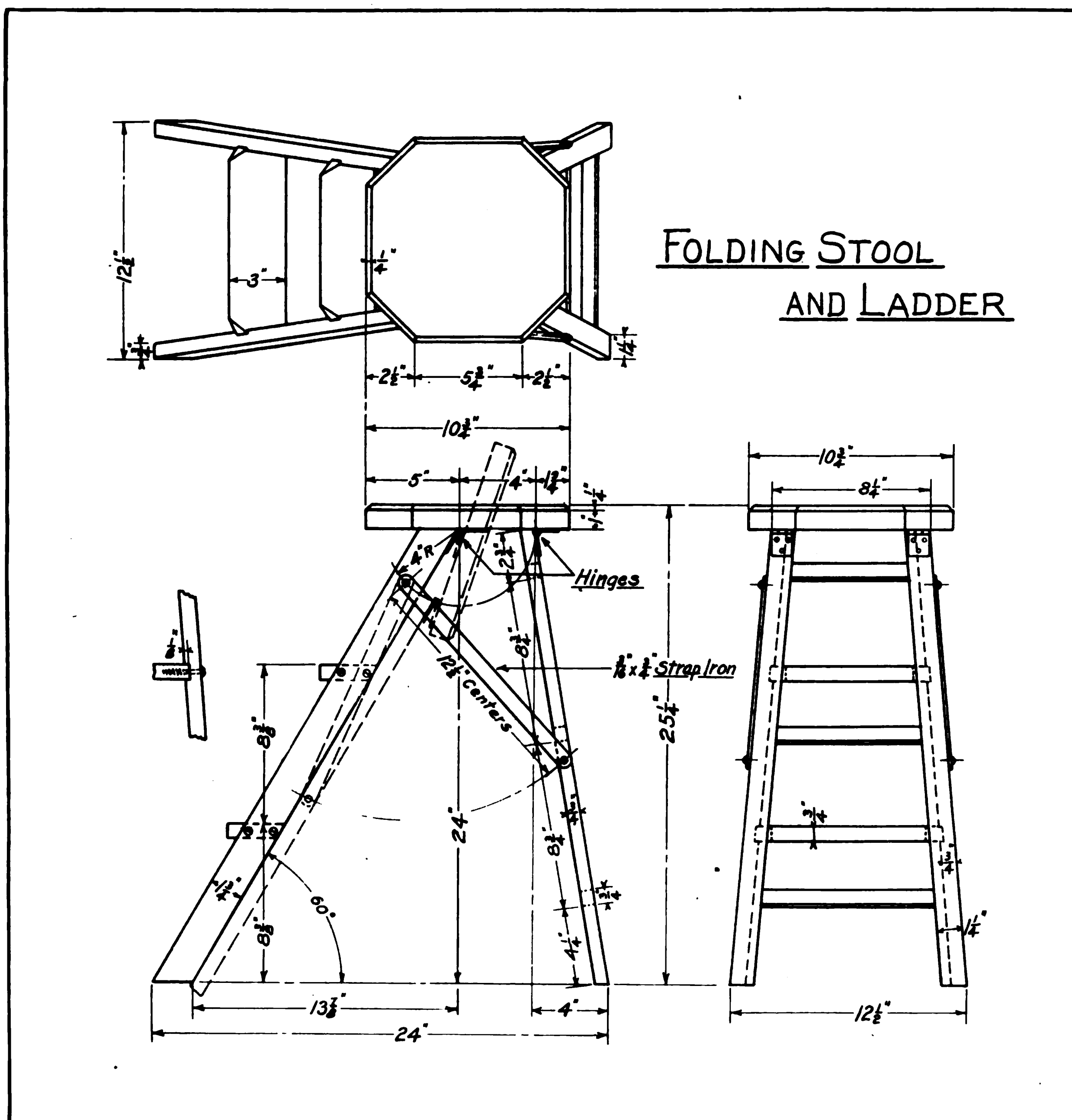
H. H. Braucher, Emporia, Kans.

The accompanying illustration and drawing show the combination ladder and stool open, closed and in the working drawing so that any boy who can follow a blueprint should be able to work out the problem in the shop.

The project is very convenient as a household ladder and stool, being easily folded and stored when not in use. In construction it is difficult enough to challenge the interest of an intelligent boy, involving as it does the laying out of numerous angles and gaines, applying in very characteristic manner the use of the steel square or the bevel or both.

In locating the pivots for the braces the use of drafting may well be brought into play for determining the points so the stool will close or fold easily and without undue strain on the bearings. By studying the points in revolution on the drawings it may be readily shown that the ends of the braces must bear definite relations to the hinges to move freely from one position to the other. If he is allowed to try to get the points by trial first and then

THE STOOL-LADDER OPENED AND FOLDED.



DETAILS OF FOLDING KITCHEN STOOL AND LADDER.

shown how they may be determined in the drafting room, I have found it effective in impressing the boy with the real value of drafting for the determination of such points before wasting time and perhaps material in a vain effort to work it out by trial and failure.

To one who has worked with such problems it is evident that the pivots must be in the arcs of circles about the points acting as centers of revolution, namely the hinges. The upper point is as far from the center of the adjacent hinge as the centers of the hinges are from each other.

The other pivot is easily obtained by cutting the center line of the other leg using the brace as a radius. It may be pointed out, also, that the sum of one long and one short side of the irregular quadrangle must be equal to the sum of the other sides, if the quadrangle is to close flat without straining the joints.

WROUGHT IRON DOOR KNOCKERS.

Thos. F. Googerty, Pontiac, Ill.

Door knockers somewhat like those shown in the illustrations can be made in the school forge shop if one understands a little about forging and using chisels on wrought iron.

Boys who have some knowledge of forging will become very much interested in such work.

The first thing to do is to make a full size free hand drawing of the front and side views. Select a piece of square soft steel of the desired size. The knocker may be made from $\frac{3}{8}$" to $1\frac{1}{2}$" square stock as desired. The first step is shown in Fig. 1. Draw out one end as shown in Fig. 1 and again as in Fig. 2. The extended part is to be used for the tongue. Split the mouth open on each side of the tongue while the metal is hot, being careful to have the tongue of uniform thickness. Do this with a thin chisel having the piece in the vise when cutting to the form of Fig. 3. Fuller back of the head and draw the piece as shown in Fig. 4. If ears are desired split them with the chisel from the back of the head and bend them up as shown in Figs. 5 and 6. Finish the bottom of the knocker in any way desired. When the whole piece is forged to the desired form grind off all parts that are too large and anneal the piece. The piece is then put in the vise and the eyes are chiseled after which the balance of the head is finished with files and chisels in any manner desired. In cutting the head, one should have diamond pointed, narrow flat and round nosed chisels. These chisels are made from $\frac{3}{8}$" hexagonal tool steel and ground with short angles. The secret of chiseling is to have the tools sharp. They must have perfectly flat angles and not rounded. Any cutting tool must have flat angles to do good work. In order to test the chisels for sharpness press the cutting edge slanting against the thumb nail. If the tool slips it is not sufficiently keen. A flat running, fine emery wheel is best for grinding.

Fig. 7 shows the form of a diamond point chisel. Notice at the bottom it is ground to a sharp angle. This is called *setting the chisel up* so that grooves can be cut with it.

MAPPING HOME PROJECTS.

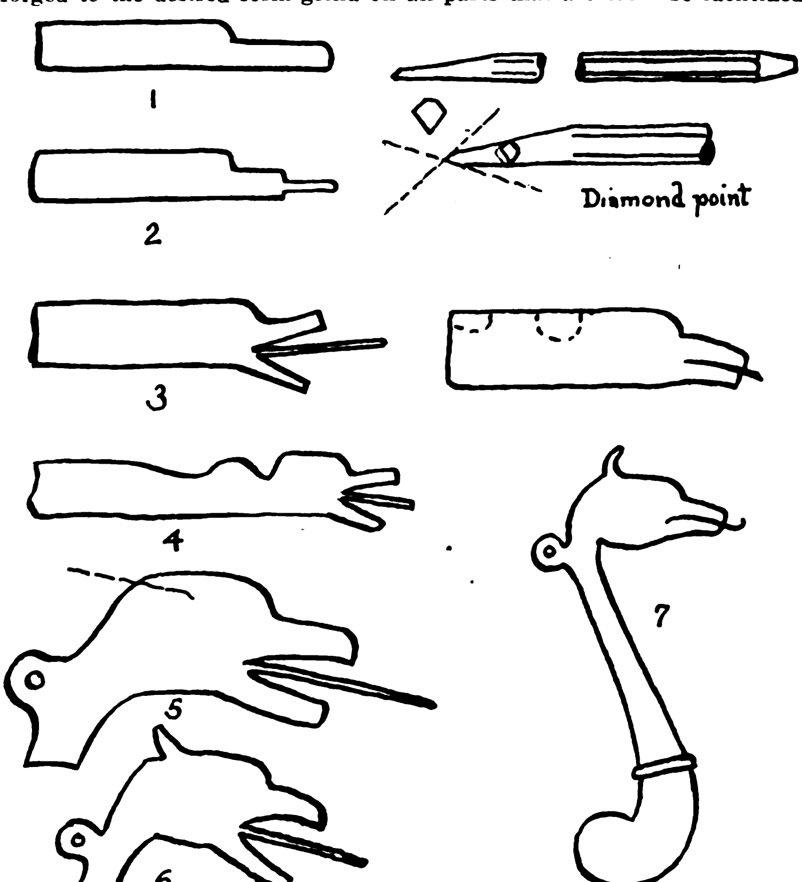
J. Q. Adams, Instructor in McMinnville, Agricultural Department.

In order to have the location of each student's home project visualized and conveniently at hand, and to most efficiently and systematically arrange trips for their supervision, the following plan is suggested:

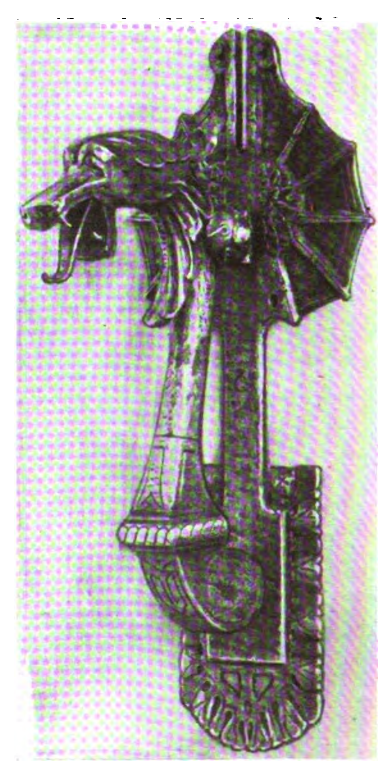
A map or blueprint sufficiently large and in detail enough to show the location of each home project, road, and other important landmark is used. A convenient size is about 18 to 20 inches square with a scale of 1 inch to the mile. The map is mounted on thick cardboard or beaverboard to make it stiff and allow pins to be stuck into it.

A numbered, typewritten list of the students having projects is prepared and posted near the margin or some convenient place on the map.

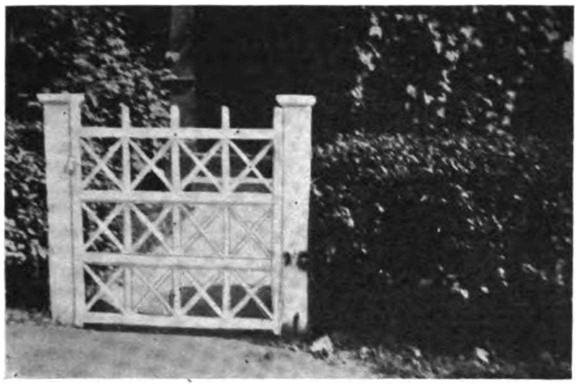
Pins are stuck in the map at each point where there is a project, pinning down small square pieces of stiff white paper, each with a number corresponding to the number found on the numbered list which was pasted to the map. By this means each pin placed on the map has a number and by referring to the numbered list each can be identified as a certain student's project.



DETAILS OF KNOCKER.



A KNOCKER FORGED BY MR. GOOGERTY.



THE GATE IN PLACE.

HEDGE GATE.

C. F. Wintersteen, Homestead, Pa.

The gate shown in the drawing was not made in a school shop but with a few common woodworking tools on an improvised bench at home.

A hankering to whittle some virgin white pine, a back to the garden and village spirit, together with a desire to improve an unkempt front yard prompted the artisan, a mechanical drawing teacher, to modify an old New England gate design for his own use.

While the gate is light in weight, it is extremely strong. It makes a delightful entrance and fills a real need.

The framework is all mortise-and-tenon construction. The lattices have to be fitted, each piece separately, and nailed.

For the gate posts, locust, chestnut, cypress, cedar or any wood that resists dampness and moisture can be used. They should be planted at least two and one-half feet deep to be below the frost line, after which they are boxed as shown. It will be necessary to exercise some care in spacing them so the gate will fit.

The drawing and brief description are submitted only as a treatment of an individual condition.

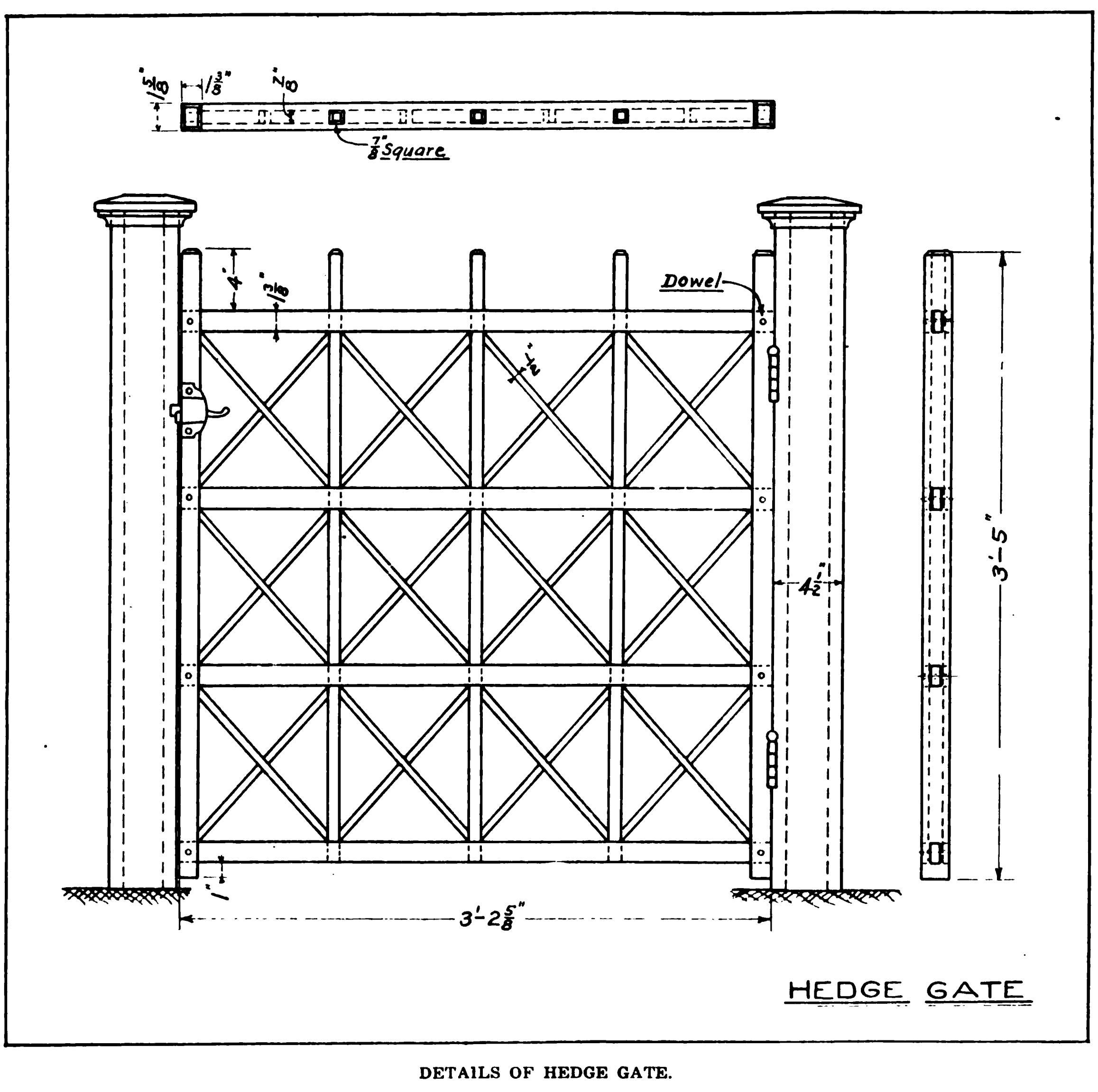
A SQUARED BLACKBOARD.

William V. Winslow, Industrial Department,
North Tonawanda, N. Y.

A shop blackboard is most serviceable when divided into squares. These squares can be made of convenient size by stepping off two inch spaces with dividers and connecting opposite points at the top and bottom and at the two sides, respectively, of the blackboard. Boards are often divided in this way in engineering schools; they are of equal advantage in secondary schools.

The scratch awl is used against a straight edge upon the surface of slate boards. The fine line left by the awl gives the instructor opportunity to observe line direction and scale while sketching drawings in a class demonstration. These scratched lines do not interefere with writing or drawings displayed in crayon upon the surface of the board for it will be found that the lines forming the squares are scarcely visible half way across the room.

Occasionally the student will find it to his advantage



DETAILS OF HEDGE GATE.

to use the board in working out a design for a piece of construction too large for full size on his drawing board.

Furniture drawing, as is the practice in the industry, should be done full size. Such drawing can be readily worked out by the student on the blackboard and will serve in a general way the purpose of a rod.

Enlarging on a Squared Blackboard.

Teachers of art are familiar with the process of enlarging by means of squares. A picture or diagram to be enlarged is divided into squares, then larger squares are made and the lines of the picture or diagram are drawn into the larger squares as they appear in the smaller ones.

It is proposed to do away w th marking squares on the original picture or diagram by tracing quarter inch squares on the surface of transparent celluloid. The celluloid thus prepared is placed over the original and a copy is then made onto the squared blackboard. Of course the celluloid can be used indefinitely; the original is not defaced.

Grade teachers will find a piece of squared celluloid a convenience in making seasonal blackboard drawings from small originals. There are books obtainable giving pictures already divided into squares for enlarging but with celluloid thus prepared any picture is at once available for this purpose.

To square a piece of celluloid place it over co-ordinate paper and trace the lines upon it with a knife by drawing the point along the edge of a brass bound ruler.

SIDE TABLE.

P. H. Heron, Head of Technical Dept., San Diego High School.

The side table was the first of a series of problems that take in commercial shop methods and was a forerunner for the construction of twenty-five teachers' desks made for the grade schools.

Twenty of these tables were made during the month of October with the intention of the school to sell them to the public at our exhibit in January but most of them were purchased by the makers.

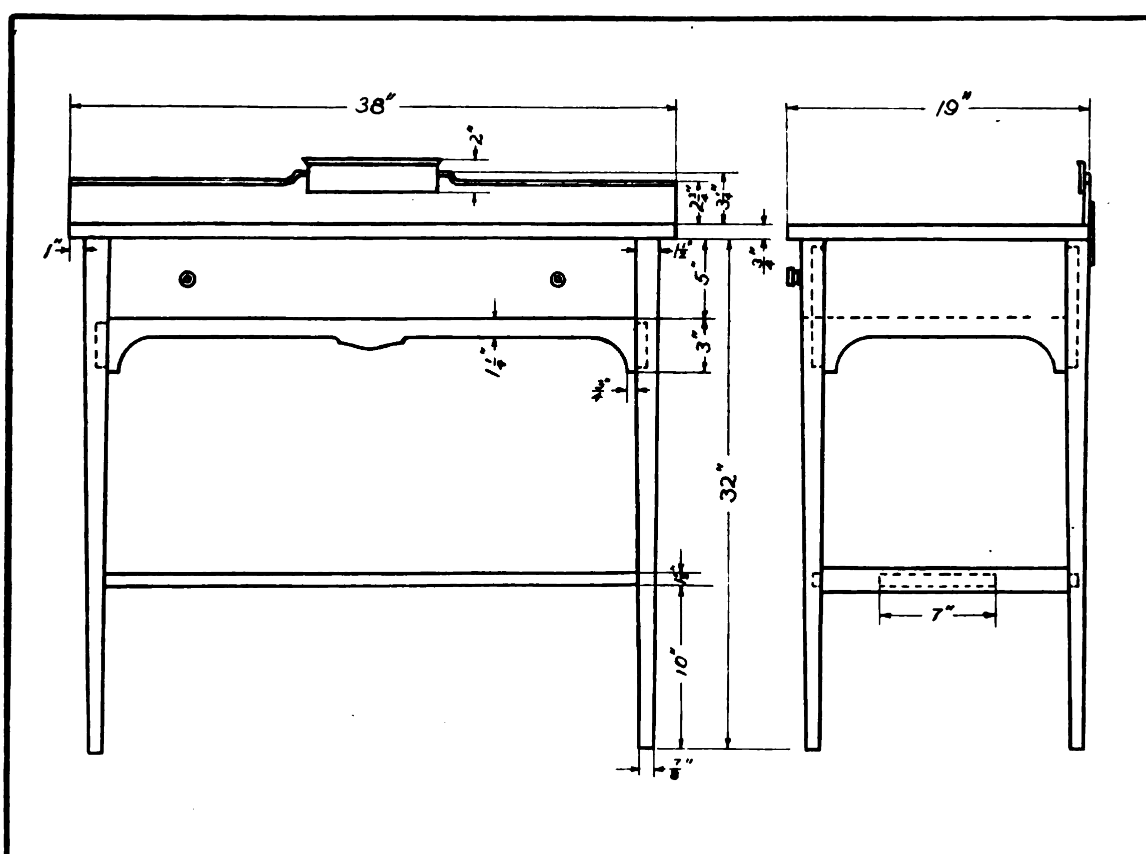
THE TABLE AS MADE BY THE AUTHOR'S CLASS.

The side table shown in the photograph was constructed of gum. Some of the others were constucted of mahogany and given a varnish finish.

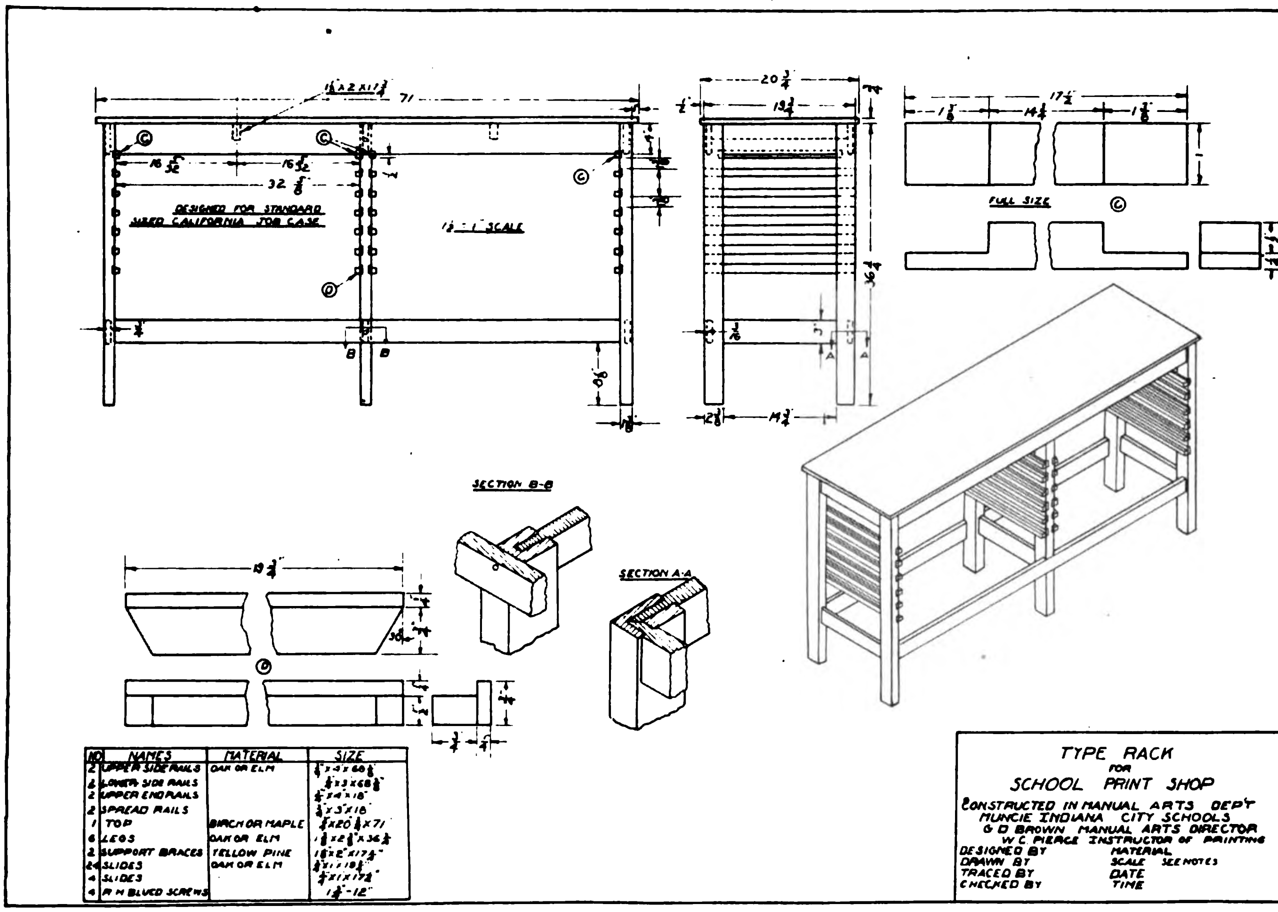
SPECIAL TYPE-RACK FOR HIGH SCHOOL PRINTSHOP.

Glen D. Brown, Director of Industrial Arts, Muncie, Indiana, City Schools.

In the wide-awake modern department of industrial arts equipped for practical instruction, the writer feels that a medium for the presentation of the highest type of practical instruction will be unfortunately disregarded unless advantage is taken of the opportunity that is offered for school shops to supply special needs of the various school departments. This statement is made, of course, with the implication that school project work for mercenary reasons only is to be condemned.



DETAILS OF SIDE TABLE.



DETAILS OF TYPE RACK FOR SCHOOL PRINT SHOPS.

Not only have many helpful problems been designed and constructed by the students of our local high school, but several innovations in special school furniture have been quite successfully designed and constructed which met a real need and supplied a means for very thoro training in drafting, mill and cabinet work.

The accompanying drawing is a special type rack designed and constructed in the industrial arts department for the print shop. The idea was that of our instructor in printing who came to us with 30 years of practical experience. For school use this type rack proved to have the following advantages over the standard type rack:

1. Its height permits the student to work more efficiently.
2. It saves floor space and it permits four boys to rack instead of two. It also provides three cases to each boy.
3. It provides an individual working bank for each boy.
4. It permits better lighting facilities.
5. The original cost is less.

NOTE: We found it expedient to purchase the regular standard California job case for these racks instead of constructing them in our shops. However, they could be used as a practical school problem.

THE LOGANSPORT CONFERENCE.

One of the objects of the conference was to bring to the attention of all of the vocational teachers the general educational value of the boys' and girls' club work—especially in developing initiative and organizing ability on the part of the pupils.

Discussion was encouraged and interesting methods of adopting valuable features of the club and project idea to the vocational program were suggested. In home economics plans whereby girls might have complete charge of planning and serving meals for small home parties were discussed.

In the industrial field the plan of getting blue prints and specifications and material from commercial establishments was recommended. It was agreed that there was some danger because the students might spoil a large percentage of material, and also that the instructor might in his zeal to show production forget that in this case the finished product must be secondary to instructional purposes. The use of jigs was attacked and successfully defended on the grounds that the idea of wholesale production was an exceedingly valuable one to impart.

The distinction between courses of study and methods with a group of vocational pupils and a similar group who were being taught for general educational purposes was thoroly discussed. It was pointed out that the aim of the general industrial group should be to broaden the experience and give a basis for later choice of an occupation while with the vocational group an occupation had already been selected and therefore the object must be to give skill in the chosen activity and information in the related technical subjects. Immediately questions arose as to methods of choosing the vocational groups. One successful director suggested careful selection on the basis of interest and aptitudes, and a simple written contract signed by the director, the parent and the pupil. He also suggested a probationary semester.

In view of the high cost of equipment and with the hope of dovetailing school and industrial experience, it was agreed that the closest possible contacts with industry should be established. The plan of working on production jobs in the school was considered to be only the first step to be followed by a rotation plan in which two pupils are paired, one being in industry and one in school. The discussion brought out the fact that in Indiana we already have a hopeful flexibility of organization. For example, pupils are working in industry and being excused to spend ten hours a week in a school drafting room. Also, in certain railroad centers where there are 8 hour shifts, young

men are getting two hours of school per day before going on to the afternoon shifts.

The discussion of the possibility of getting more of the shop or laboratory activity in the commercial or industrial field naturally led to a consideration of the importance of the related subjects. Perhaps, there is no portion of the vocational field more in need of careful study and more in need of better trained teachers than the related subjects field.

As a problem for the following year it was agreed that mathematics or science as related subjects would be studied intensively thruout the year by a committee who would also agree to present their courses to the vocational groups. —*H. G. McComb.*

PRINTING TEACHERS' ASSOCIATION HOLDS FIRST REGIONAL MEETING AND DINNER.

The New York and New Jersey Chapter of the National Association of Printing Teachers held its first meeting and dinner Saturday evening, April 9, 1921, at Hotel Gonfarone, New York City. About forty teachers of printing from all parts of New York and New Jersey were present.

An address was made by Mr. John Clyde Oswald, editor of "The American Printer," who spoke on the work being done by the education committee of the United Typothetae of America, and also on the need of apprentices. Mr. Clifford E. Parsil, director of vocational schools, Middlesex County, N. J., followed with an instructive talk on "Teacher Training and Trade Analysis as Applied to Printing."

The feature of the evening was an illustrative talk by Mr. Frank A. Baker of Montclair, N. J., High School on "Linoleum Block Printing." Portfolios of printing specimens completed in a school print shop were distributed among the members. To conclude the meeting a brief address on the plan and aims of the organization was given by Mr. David Daniels, Newark, N. J., temporary chairman.

The officers elected to serve the ensuing year are: J. E. Mansfield, New York, president; H. Burns, Newark, N. J., vice-president; A. H. Mathieson, Brooklyn, N. Y., treasurer; D. Daniels, Newark, N. J., secretary. The next meeting will take place in June.—David Daniels.

New York Shop Teachers' Dinner.

At the dinner of the New York Associated Teachers of Shopwork, held at the Hotel Pennsylvania on April 16th, facts were presented showing how urgently legislation is needed to protect school financing. President Timothy Poucher and R. G. Weyh, Jr., toastmaster, declared that this association could be counted upon in the campaign for financial independence for boards of education in cities of the state.

Superintendent Mondel told of the developments at Albany and the certainty that next year legislation affecting the organization and administration of the schools will be passed. He pointed out that education is the weakest of all functions and needs the greatest legislative protection. He referred to many of the unfortunate results of dual control and made a forceful plea for united action.

Further facts showing the unfortunate financial situation in the schools were presented by T. W. Metcalfe, who showed how it will be necessary in 1922 to meet a larger deficit than in 1921 by a bond issue. He reviewed the state-wide campaign and urged the shop teachers to join in it.

Mr. Samuel Stern of the board of education paid a tribute to the work of the shop teachers commending highly the courses conducted and the exhibit of work on display.

The exhibit was also commended by Associate Supt. Gustav Straubenmuller, who delivered an address, stressing the importance of the "will to do." He illustrated his points with stories and predicted that in time the shop teacher will be an influence thru the schools, instead of upon only the older pupils who now come under their instruction.

SCHOOL CRAFTS CLUB MEETING.

The April round-table meeting of the School Crafts Club was held April 23rd, at the Murray Hill Vocational School, New York City.

At the meeting, the sessions were divided into three divisions, embracing art metal work, woodcraft, and the forum. The first round table was in charge of Mrs. Annie C. Coe of Brooklyn, who gave illustrations of work which has actually been accomplished. Mr. Thomas Hogan of New York City, was in charge of the second table, and Mr. F. C. Arnold of the Evander Childs High School, New York City, of the third. At the latter the topic was classroom management with regard to the shop.

A Horological Conference.

A horological conference will be held on Thursday and Friday, May 19 and 20, under the auspices of the National Research Council, at its offices 1701 Massachusetts Ave., Washington, D. C.

The conference has for its purpose a study of the labor situation in the field of watch making and a discussion of the means of overcoming the shortage. At the conference various speakers will talk on means for stabilizing the profession, the standardization of horological school curricula, the certification of watch makers, the establishment of a national horological institute, and ways and means for increasing interest in watch making.

The conference will listen to the reports of the committees on certificating methods, national institute and ways and means for creating interest in watch making.

Among the well-known speakers will be Mr. John J. Bowman, Bowman Technical School, Lancaster, Pa.; Mr. A. G. Westlake, Bradley Polytechnic Institute, Peoria, Ill.; R. T. Fisher, director for vocational rehabilitation, Federal Board for Vocational Education; Mr. E. F. Lilley, New England Jewelers' Association, Milford, Mass.; R. F. Nattan, Jewelers' Association, New York City; Mr. Tell B. Nussbaum, Hamilton Watch Co., Lancaster, Pa.; W. Calver Moore, Keystone Publishing Co., Philadelphia, Pa.; F. T. Haschka, Tiffany Co., New York, N. Y.; Geo. W. Spier, Washington, D. C.

A GRADING CHART FOR MECHANICAL DRAWING.

Mr. P. M. Spink, director of manual training at Faribault, Minn., has recently put on the market a grading chart for mechanical drawing. The chart is based on the same general principles that have been used in the formulation of the well known Ayres writing chart and has been evolved from an examination of plates of a large number of pupils in mechanical drawing in the seventh and eighth grades and in the high school.

The plates contain the single practice line, "The slow fox jumped quickly over the lazy brown dog" and represent the same in one-quarter and three-eighths inch lettering with Roman and Italic letters. At the bottom of each plate there are numerals, typical solid and dotted lines, curved figures and dimension lines. The several plates are evaluated on the basis of one hundred for the grades and for the high school. The work of the students can be readily rated by simply comparing it with the plate which it most nearly resembles in quality.

The plates are intended to establish a definite value for successful work and to remove the subjective elements of rating.

SPECIMENS OF PRINTING.

The Industrial Arts Magazine is in receipt of a portfolio of most interesting printing specimens sent by Mr. David Daniels, Instructor in Printing at the West Side School, Newark, N. J. The portfolio contains only specimens of work done by students in the eighth grade. The West Side School is an elementary school and its shop work is entirely limited to the elementary grade work.

The most impressive bit of work included is a sixteen-page booklet of illustrated nursery rhymes designed, set in type and printed entirely by the boys. The booklet cover and six full pages are illustrated with linoleum blocks designed and cut by the boys and colored with water color paints. The plates show considerable originality and good taste.

Among the useful examples of work is a series of four-page circulars used to correlate the printing with the academic work of the school. The circulars include such topics as the abbreviations of the states, list of common homonyms and antonyms, list of roman numerals, common abbreviations for the seventh grade.

Other circulars include poems, editorials and brief articles of value.

One of the useful productions of the school is a calendar, each leaf of which includes in addition to the calendar for the month an appropriate poem or prose quotation selected by a student and set in type and printed.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Weaving on a Hand Loom.

183. Q:—Two of my students are building a little hand loom, for making neckties from an article by Louis J. Haas, in your November, 1918, issue of the Magazine. Where can I get instructions as to best material and an idea of how the patterns are woven in.—C. H. S.

A:—The article "Equipment for the Bedside Occupation of Men" explains clearly just how to warp or thread up the necktie loom. It also explains how to narrow the weaving to form the neck of the tie, and how to widen it out again to form the tail of the tie. The method of producing a selvedge across the tail end of the woven tie is explained. The method of threading up the loom allows the weaving to start with a selvedge across the front end of the tie. This end of the completed tie can be released from the warp link by simply cutting the chain stitch which connects it with the link.

To start weaving with this loom, the initial shed is opened by placing the reed or beater in the upper notches. Pass the shuttle thru the shed, take the end of the woof thread around the first warp thread and pass it in again thru the same shed about one-half an inch. Release the reed or beater from the upper notches and pull all the way forward packing the woof thread firmly home between the warp threads. Reverse the shed by placing the beater now in the lower notches. Pass the shuttle with the woof thread back thru the shed, and then beat in place as before. Plain weaving consists of just the orderly repetition of the above. A good selvedge is gained by just pulling the woof threads all the way thru but not the least taut before beating home. Practice shows that if the woof thread is placed in a diagonal position across thru the shed before beating it home, this eliminates the tendency of the selvedge to become tucked in and keeps the weaving full width.

The following may give just a brief insight into the method of weaving patterns upon the necktie loom. First I would suggest that the beginner thread his loom with a three-ply hard twist (natural color) mercerized cotton warp thread. This makes a very strong warp which will behave well in inexperienced hands. Use the same for the woof thread which is wound upon the shuttle. Have a second wound with a four or six-ply soft twist, natural mercerized cotton thread for the pattern. The pattern thread may be left natural in color or dyed, with diamond or rainbow or some such dye, by following the directions contained on the package of dye. The thread may be procured from any wholesale dealer in yarns for weaving purposes, altho small quantities can be perhaps more easily obtained in the department stores. Start the tie by weaving ¼ inch of plain with the three-ply woof thread. Weave the last plain woof thread with the shed opened by placing the beater in the upper notches. Now start the pattern thread thus: bring the beater out of the notches and let it hang neutral, and begin counting off the pattern with the point of the pattern shuttle. First pass over two warp and under the next two threads, following this order all the way across the warp. Pull the thread thru, then take the end of the pattern thread around the first warp thread, and in and over and under the same threads for one-half inch and then beat home. Now place the beater in the lower notches and then pass a single woof thread thru this shed and beat home. Bring the reed or beater to neutral again and count back with the point of the pattern shuttle, the pattern combination going over and under the very same group of warp threads. Pull this pattern thread thru, beat home, place beater now in upper notches, put in single thread and beat home. Continue this sequence of pattern thread, woof thread, taking care to alternate the sheds for the woof threads in the exact order described. Following the above will give us a pattern a number of narrow stripes running with the length of the belt or tie. By advancing the count of two over and two under just one warp thread each time a pattern thread is put in produces diagonal stripes. Quite different effects can be produced by experimenting with different counts such as two over and six under, or three over and three under, also by combining these. Thus the first pattern thread might be one group of counts, the second pattern thread another, and the third pattern thread still another and the fourth would start repeating the first combination. Patterns may also be grouped between spaces of plain weaving. Setting up the loom with some of the warp threads in color also offers a series of decorative possibilities.

When ready to narrow the tie, end the pattern thread just as you started it and cut it off. The neck of the tie is woven only with the three-ply woof thread. The tail of the tie may be completed with the plain weaving or the pattern may be introduced again as soon as the widening of the tail of the tie has been completed. The widening and narrowing process is fully explained in the article mentioned above. Belts should start with the weaving four inches from the warp link; when completed, the warp at each end is tied into tassels. The pattern usually continues thruout the length of the belt. After experience has been gained suitable silk thread may be used.—Louis J. Haas.

Boat Building.

191. Q:—Will you kindly advise me where I may secure good blue prints for a flat-bottom boat?—E. A. F.

A:—You will find exactly what you want in Stephens' "Boat Building Plates," published by Forest & Stream Publishing Co., New York City. You can also find some simple boats in Hall's "The Boy Craftsman," published by Lothrop, Lee & Shepard, and in Miller's "Canoeing and Sailing," publishing by Geo. H. Doran Co., New York City.

Treatment of Sticky Leather.

192. Q:—Have a leather chair and in warm weather I am troubled with cloth sticking to it. Could you give me any information to remedy the trouble?—H. R. D.

A:—Sticky leather may be readily treated by the following method:

Wash the seat and the back thoroly and let them dry. Then give them two thin coats of shellac. A lacquer may be used in place of the shellac, if available. The shellac should be cut with alcohol as a reducer and should be brushed on as thinly as possible.

Tarnish Prevention on Brass.

193. Q:—Can you give me some method of treating brass so that it will not tarnish? I have a number of brass articles that I have made and I understand that there is some way of treating the surface to keep it from tarnishing.—J. K.

A:—Brass articles may be kept from tarnishing by giving them a coat of metal lacquer or a coat of shellac to which camphor has been added. A good formula is the following:

Dissolve one ounce of best brown shellac in one pint of alcohol (wood alcohol will answer and is much cheaper), and add to such solution 1 dr. of gamboge and 3 dr. of cape aloes. Heat the articles and apply the lacquer with a camel's hair brush. The articles should be thoroly cleaned and polished before the lacquer is applied, otherwise the result will be disappointing.

Refinishing a Table Top.

194. Q:—I am refinishing a table top of oak which has apparently been filled with a silex wood filler. The top was deeply scratched and must be rescraped and resandpapered. Could you suggest a way of taking out the scratch?

Can you give me the name of a book or any other material on furniture refinishing?—L. E. H.

A:—Table tops, or other surfaces undergoing a refinish and which must be resurfaced to the new wood, may have the silex filler softened up, if a liquid varnish remover is brushed on and allowed to remain long enough to soften the filler, presuming of course that the old varnish has been removed to this point. A steel brush of the short bristle type, such as is used by painters in cleaning off siding and other outside work, may then be used as a picking brush to remove the filler.

This is accomplished by brushing carefully with the grain using a short, choppy stroke in which the brush is quickly forced down into the work and lifted up away from the surface at the end of the stroke in such a manner as

to enable the bristle to flick out the filler with which it comes in contact. After this operation is complete and the wood is still soft from the varnish remover, little or no difficulty should be experienced in scraping to a new surface provided, however, that the scraper be sharpened to a long, thin bevel edge in preference to the usual method of turning the short square edge. Sometimes after picking with the steel brush, the use of a little benzine swabbed on with a rag just ahead of the scraper blade will enable the scraper to take hold when nothing else seems to do the work.

For material on refinishing furniture, consult back numbers of the Industrial-Arts Magazine for Apr., 1919, p. 160; Jan., 1917, p. 44; Mar., 1917, p. 132; Nov., 1919, p. 469; June, 1917, p. 262. Kelly's "Expert Wood Finisher," published by the author, at Malvern, Pa., is a good text for this work—Ralph G. Waring.

Mechanical Drawing Problems.

198. Q:—In a mechanical drawing, side view, of a bolt and nut with the end of the bolt just partly thru the nut, in what direction would you show the lines representing the threads of the nut that are not in contact with the bolt? Assume the bolt and nut with standard right hand thread.

In drawing an isometric of a figure, such as a sphere surrounded by a flange, how do I draw the sphere isometrically? The flange is simple enough, but how about the sphere?—H. N. A.

A:—Some firms have abandoned entirely showing threads by slant lines and use lines at right angles to the edge of the bolt. In any case the thread in the upper half of the nut slants the same direction as on the bolt and should be shown thus. If the nut is shown in section then the thread on the lower half of the nut would be seen and the nut thread would appear as a left-hand thread.

A sphere is shown as a circle in isometric drawing, while the flange will be an ellipse cutting the sphere. Refer to Isometric Drawing by A. P. Jamison (John Wiley & Sons) in which will be found a number of cases showing spheres.—Geo. Ellison.

NEW BOOKS

Problems in Elementary Woodworking.

By Hugo J. P. Vitz. Cloth, 8½x6½, 126 pages. The Southern Publishing Co., Dallas, Tex.

This book presents two years of work for introductory woodworking classes and assumes that instruction will be given by the group method. In part one, the class is introduced to simple one-piece problems and butt joint construction, with nail and screw fastenings. The projects are grouped according to the nature of the structure and each group includes photographs of ten to fifteen models, working drawings, and simple suggestions. Students are expected to choose one model from each group. This feature of the book allows for personal likes and needs of boys and recognizes individual capacity.

The second half of the book follows the same plan and carries the work along in the making of simple articles of furniture, home utilities and toys. The careful grading of objects in the first half of the book is continued. The pieces involve dado and face cross-lap joints, edge cross-lap and dowel edge joints, and dowel butt joints.

It is interesting to note that the author has not entirely abandoned the old-time "exercise," but uses a single piece as a means of introducing each year's work. He recognizes the desirability of original design and supplies several sheets of cross-sectioned paper, following each group, for pencil sketches.

Elementary Home Economics.

By Mary Lockwood Matthews. Cloth, 12mo, 343 pages. Little, Brown & Co., Boston.

Sewing and textiles, foods and cookery, and the care of the house are included in this well-balanced text. The work is developed on the project basis so that the purely informational material, the laboratory exercises, the home problems and the questions all have a central basis of interest and application. The section on sewing offers six general projects; work in cooking is divided into "meals" and care of the house suggests a daily, weekly and seasonal "schedule" of tasks.

The book is simple in style and well within the abilities of seventh and eighth grade girls. The treatment is entirely free from the tendency to emphasize over-strongly the art, or health, or economic aspects of the subject.

Stenciling.

By Adelaide Mickel. Paper, crown octavo, 62 pages. Manual Arts Press, Peoria, Ill.

This is a simple handbook presenting the elements of the art of stenciling in form for use by art and domestic-science teachers. It begins with detailed descriptions of the materials, tools and equipment and of the several processes. The most valuable section is a series of graded projects for the elementary and high schools. The book is entirely practical; the designs are appropriate and simple enough for children; the illustrations are complete.

Gasoline Automobiles.

By James A. Moyer. Cloth, octavo, 261 pages. McGraw-Hill Book Co., New York, N. Y.

The gasoline automobile has been developed on certain principles that must be understood by the driver to obtain even the most ordinary results. Again, the problem of troubles and cost of operation are relieved by at least the appreciation of causes and effects.

This book, entitled "Gasoline Automobiles," pretends to be just a statement of principles or causes and effects. It is simple, comprehensive and not too technical for the "man who owns one."

The Manufacture of Pulp and Paper.

By J. J. Clark. Cloth, 6x9, 441 pages, fully illustrated. McGraw-Hill Book Co., Publishers, New York, N. Y.

This book is the first of a series of five volumes prepared under the direction of the Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry of the United States and Canada. The series is to take up in detail the mathematics of the industry, mechanical drawing, physics, mechanics and hydraulics, electricity and chemistry, the preparation of pulp and the manufacture of paper.

The present book is limited to arithmetic, applied mathematics, the reading of mechanical drawings, and the elements of physics. The book is written in that clear and complete style that is necessary for correspondence instruction. It simply states definitions and principles and explains these completely. Only a very limited number of examples is added to each section to illustrate the principles discussed.

The section on mathematics includes the elements of algebra and geometry and advances into trigonometry far enough to explain the mensuration of solids.

The section on blueprint reading is of the briefest kind but is ample to give the student a sufficient understanding of the subject to read simple drawings of paper-making machines.

The section on physics includes matter, motion and force, hydrostatics and pneumatics, heat and light. The treatment is of the practical applied type and takes illustrations from everyday life and industry.

Handbook of Tailoring.

By Franz F. Deiner. Cloth, 152 pages, illustrated. Published by H. B. Niver for F. F. Deiner & Co., 417 Fifth Ave., New York, N. Y.

This book outlines the sectional system of organizing a tailor shop. It divides the making of a coat into 74 operations, and analyzes each on the basis of processes, time, etc. The apportionment of operations in sections is described for shops of various sizes, so that the most advantageous combinations can be made in shops employing as few as fourteen workers and as many as 150 workers. The book is concise and to the point and avoids all theoretic discussions and suggestions. Two final chapters describe methods of making alterations and of keeping shop records.

Some Exercises in Farm Handicraft for Rural Schools. H. O. Sampson. Bulletin 527, 1917, U. S. Department of Agriculture. This bulletin offers instruction in the making of useful articles for the school, farm and home. It is primarily intended for rural school teachers and for pupils of the seventh and eighth grades and the exercises have practical application to the agricultural work of the school and to the various club projects in agriculture.

The Care of Leather. By F. P. Veitch, H. P. Holman and R. W. Frey. A contribution from the Bureau of chemistry. Farmers' Bulletin 1183, December, 1920, U. S. Department of Agriculture, Washington, D. C. The bulletin contains suggestions for a judicious selection of articles made from leather and tells how to care for them in order to obtain maximum service. The pamphlet discusses in detail, selection, care, and preservation of leather in shoes, harness, belting and book and bag leather.

NEWS NOTES FROM THE FIELD.

Foreman Training Courses. Mr. Charles R. Allen, special agent for the Federal Board for Vocational Education, has recently completed an analysis of the job of foreman. Mr. Allen who has worked with the foremen in several of the large eastern plants, has developed some foreman training courses which are the most complete on record.

Among the foreman training courses which Mr. Allen had developed, these five are recommended: (1) Courses dealing with the supervision of production; (2) Courses dealing with managerial cost control; (3) Courses dealing with the training of help; (4) Courses dealing with necessary technical knowledge, and (5) Courses offering training in necessary manual skill.

Teacher Training for Women. The first teacher training class for women in industry in Dallas, Tex., was conducted by Miss Katherine C. Ball, teacher trainer for the Department of Trade and Industrial Education of the University of Texas. In all, five teachers have completed the first unit of instruction and have been given certificates.

Oxy-Acetylene Welding Class. A class in oxy-acetylene welding was conducted the past winter at Fort Worth, Tex. Twenty-one students took the work.

Teacher Training for Men. A teacher training class for men was opened at Fort Worth, Tex., with an enrollment of fifteen. Teachers are available for the following trades: Printing, painting, plumbing, battery service, automobile mechanics, cabinet making, millwork, carpentry, steam fitting, oil refining, welding and drafting.

Bookbinding Class. A bookbinding class has been organized at Houston, Tex., with the cooperation of the printers and bookbinders of the city. The students comprise those who are already workers in the trade and who hope to become more efficient thru the course. It is the first class for bookbinders to be organized under the Smith-Hughes law in Texas.

Teacher Training for Women. A class of seven was recently graduated from the teacher training course conducted at Houston, Tex., by Miss Cecil M. Burdick, of the Department of Trade and Industrial Education of the State University. The students were given certificates to teach bookbinding, art needlework, dressmaking, power machine work, table service, retail selling and millinery.

Part-Time Printing Class. A part-time class for printers has been organized at Galveston, Tex. The work has been begun with the cooperation of the city printers.

Trade Extension School. Mr. Howard L. Briggs, Director of Industrial Education at El Paso, Tex., is planning a large evening trade extension school next fall. Mr. Briggs is cooperating with the teacher trainer of the State University in the selection of teachers for next year's classes.

Part-Time Class for Printers' Apprentices. A part-time class for printers' apprentices has been formed at El Paso, Tex., with the cooperation of the city printers.

Smith-Hughes Classes. A total of 36 Smith-Hughes classes were conducted at Houston, Tex., during the past winter. Among the subjects taught were drawing for the building trades, blueprint reading, mathematics for electricians, printing and automobile mechanics.

Teacher Training Class. A teacher training class organized by Mr. L. W. Fox was conducted recently by Mr. Joseph H. Mueller, of the Department of Trade and Industrial Education, University of Texas, at San Antonio. Instructors were trained to conduct short unit courses in automobile mechanics, engines, ignition, carburetion, generators, and motor generators, starting and lighting, and storage battery. In addition there were short unit courses for sheet metal workers, carpenters, building trade mechanics, and machinists.

Continuation Law Changed. The New York Senate has passed the education committee bill amending the continuation school law to reduce the age limit from 18 to 17 years, to exempt 16-year-old workers until September, 1925, and providing for Saturday sessions. The bill goes to the Assembly for approval.

Government Vocational School. One hundred and sixteen soldiers have entered the vocational school conducted by the government at Nauvoo, Ill. Among the subjects taught are mechanical drawing, tailoring, shoe repairing, and watch making.

Service Men Return to Trades. It is estimated that one or more of the 1200 disabled service men receiving vocational training in St. Louis are daily returning to civilian employment. Practically all educational institutions in St. Louis are being used in training the men. In

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addition, shops, factories and industrial establishments are being utilized in providing vocational training on the job.

Vocational Guidance in High School. A vocational guidance bureau has been a part of the Technical High School at Fall River, Mass., for the past four years. The director of the bureau is a member of the faculty and gives one-half her time to the work of counselling.

The bureau is of great assistance to students who are undecided as to the course to follow until graduation. Along this line, reading material is furnished and some visits are made to institutions in order that the student may better understand certain vocations.

The director finds that counseling with freshmen reveals among other things, the misfits in courses and violations of labor laws by minors. Most of the pupils welcome an opportunity to talk over matters with the instructors. Parents often call to talk over the future of students and opportunities are always offered for a more intimate touch between the school and the home. Where violations of the law have occurred, the cases are referred to the state agent who interviews the parents and the employer, thereby adjusting matters satisfactorily.

Senior counseling, it is pointed out, reveals many factors and is largely a matter of giving assistance in preparing for new work immediately upon graduation. This help includes writing to institutions for information on points concerning individual cases, furnishing catalogs, seeking information about scholarships or means of self-support, and communicating with placement bureaus in the large cities.

The work also includes vocational talks by well known speakers and a study of occupations. The latter is intended to broaden the pupil's knowledge of opportunities open to him and to create a deeper respect for honorable callings. Another phase of the work is the making of records for pupils leaving school and counseling with them at this critical time. It is felt that a distinct advance might be made if the school required a week's notice from those who intend to withdraw from school, since many might be induced to remain if the proper steps were taken.

A Vocational Survey. Mr. E. E. Gunn, State Supervisor of Trade and Industrial Education for Wisconsin, has made a survey of the work at the Fond du Lac Vocational School. The study is to embrace attendance, courses, housing, equipment, enrollment and the tangible results of the work. The survey will include suggestions for improvement and favorable comments where the work is deemed especially noteworthy.

Teachers Graduate at Trade School. A class of seventeen was recently graduated from the teacher training class at the Boys' Trade School, in Worcester, Mass. The men received certificates permitting them to teach in school shops. The class is the first of the kind to be established in the school and was under the direction of Mr. Edgar P. Neal.

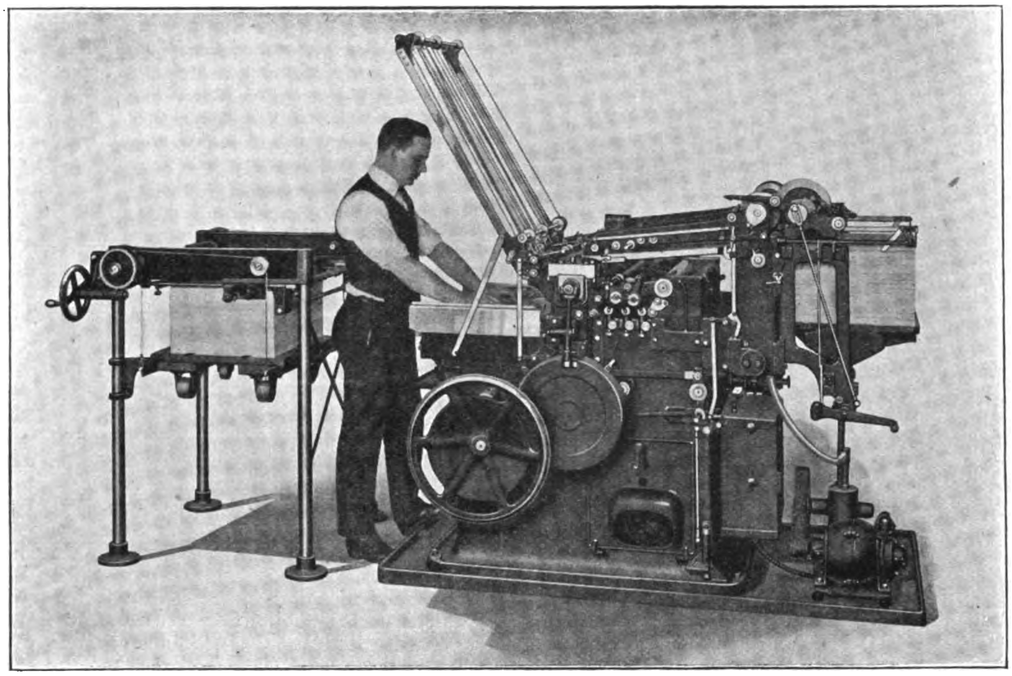
A study of high school problems has been begun by Supt. David B. Corson of Newark, N. J., in cooperation with Dr. David Snedden of Columbia University. An appropriation of $500 has been made to cover the expense of the survey.

The survey has two aims in view, namely, to determine the continuance of the present type of technical courses, and to select the location for a fifth high school.

It has been pointed out by Dr. Corson that the technical courses in the high school are not satisfactory. At the time the courses were planned, it was believed that colleges and universities in the east would assume the same liberal attitude in regard to entrance requirements that those in the west had. This was not done and students who sought to enter higher institutions were compelled to alter their courses, minimizing the shop instruction and substituting languages, in order to make the necessary credits. On the other hand, it is shown that the shopwork in the present high school is not sufficient to prepare students for immediate entrance into an industry.

It is proposed that the present valuable equipment of the high schools shall be transferred to the new Seymour Vocational School and that the technical curricula shall be withdrawn from the high schools. It is possible that the high school course will be retained for the training of foremen in industry.

The sum of $250,000 is set aside in the will of the late



The Kelly Automatic Press with Extension Delivery. (The Kelly Press is sold with or without the Extension Delivery.)

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mates of the cost for building and equipment have been prepared for the approval of the taxpayers early in the fall.

Improvement Courses for Teachers. The vocational teacher training department of the University of Pennsylvania is offering socalled improvement courses for the benefit of continuation teachers. Among the subjects studied are types of pupils, functions of the part-time school, method and content of courses, standards for maintaining internal and external relations, related subjects, community and employment interests, vocational guidance and placement, civics and hygiene. The courses are free to teachers and principals of continuation classes.

To Erect Vocational School. A vocational high school will be erected for Lower Paxton Township, in Lancaster County, Pa. The building is expected to be ready by September.

Electrical Class. A class in electricity has been formed at the high school, Troy, N. Y., for the benefit of disabled soldiers.

Vocational School. A government vocational school has been established at the White Sulphur Springs institution, at Waynesville, N. C.

School for Printers. The New York City School for Printers, which was opened in 1913 in the rooms of the Hudson Guild on West Twenty-seventh Street, has outgrown its quarters and moved to a new location on Sixth Avenue. The school is intended for apprentices of employing printers and has for its purpose a more highly trained class of workers and the making of good citizens. Mr. Arthur L. Blue, an active member of a New York typographical union, is managing director of the school. At present the school devotes itself to the training of the compositor but it is hoped later to add press work, linotype, photo-engraving, electrotyping and other branches of the trade.

Evening Electrical Course. A course in the theory of electricity has been opened at the evening vocational school. The course will run until June first.

Vocational School for Colored Girls. The Tennessee legislature has passed a bill providing for the erection and equipment of a vocational school for colored girls. The bill provides an appropriation of $30,000 for the work.

To Investigate Treatment of War Veterans. President Harding has announced the appointment of a special committee of nine to make a study of the War Risk Insurance Bureau, the Federal Board of Vocational Education and the care and treatment of wounded or impaired service men. The inquiry is intended to pave the way for a definite, workable policy, to correct inadequate hospital facilities, and to plan for future needs. The members of the committee which include Mr. F. G. Galbraith of Cincinnati, Mr. T. W. Miller of Delaware, Mr. Theodore Roosevelt, Mrs. Douglas Robinson of New York, Mr. J. L. Lewis of Indianapolis, Mr. Franklin D'Olier, Mrs. Henry R. Rea of Pittsburgh, Mr. M. J. Foreman of Chicago, Mr. H. S. Berry of Hendersonville, Tenn., and Mr. T. V. O'Connor of Buffalo, have accepted appointment.

Refers Report. The school board of Cincinnati has referred to the Committee of the Whole, a report on vocational education made by Supt. R. J. Condon, a vigorous supporter of the system. Test votes indicate that the board will continue to support vocational education for pupils who will earn their living in shops and factories.

Overwhelming opposition to the Fearon-Hutchinson bill, repealing the continuation school law of New York State has been manifested by delegates from all parts of the state who attended the preliminary hearing at Albany. At the conference of the delegates who had gathered to oppose the bill were some fifty persons from New York City, Utica, Mount Vernon, White Plains, Gloversville and other cities—all prepared to show that the law was working well and that it should not be repealed. It was brought out that the law is being enforced for the younger workers and is working well. A mass of testimony favorable to the law from employers has been gathered for use at the trial.

It is expected that support for the bill will come from the mayors' conference of the state and from a few city officials.

Attendance Increases. Thirteen part-time classes were conducted during the past few months at the Broadway High School, Seattle, Wash. The classes had a registration of 120 girls and 150 boys from fifty firms where minors are employed.

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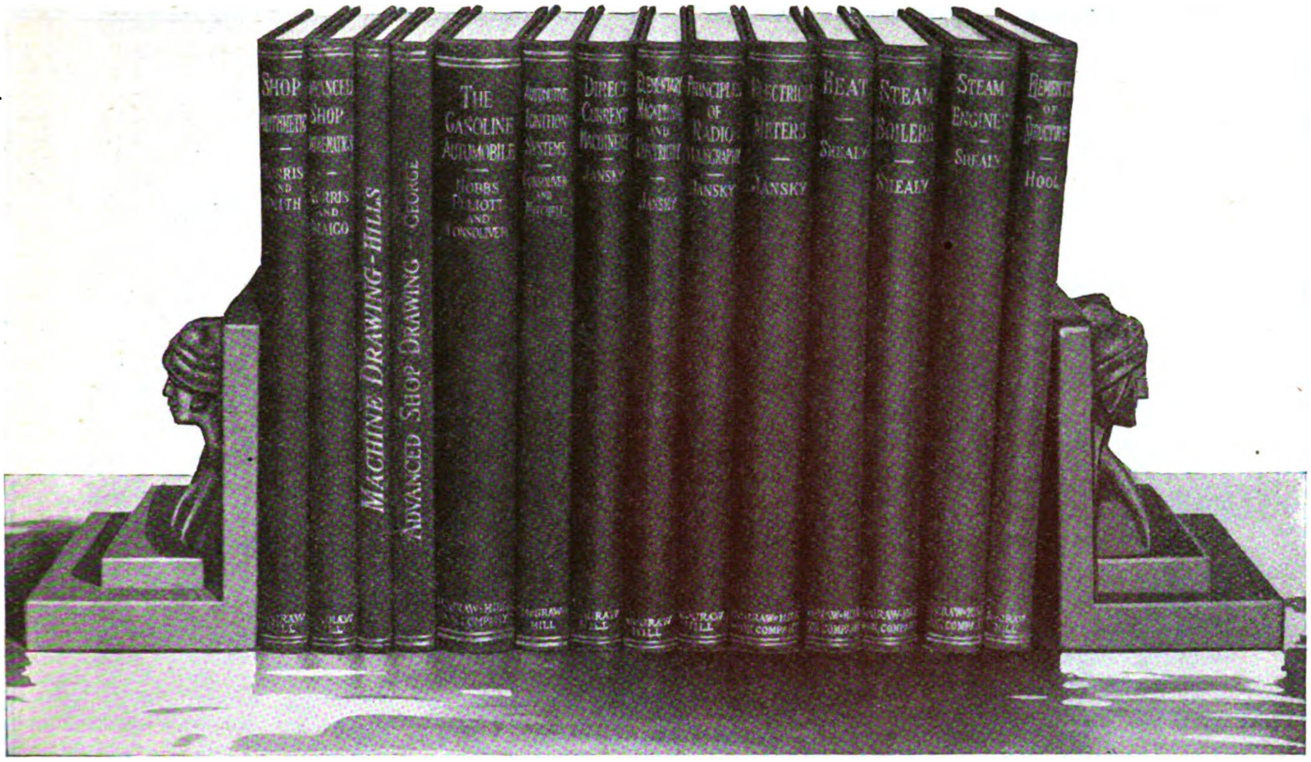
MACHINE DRAWING-HILLS
ADVANCED SHOP DRAWING GEORGE
THE GASOLINE AUTOMOBILE
HEAT
STEAM BOILERS
STEAM ENGINES

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Part-Time Schools Succeed. The part-time school is the most hopeful part of New York State's vocational program, according to Mr. L. A. Wilson, Director of Vocational Education. Mr. Lewis points out that employers have been thoroly converted to the value of the part-time school and there is evidence to show that it does more than any other school to conserve the adult earning power of the boys and girls.

Tin Can Problems. The special classes at Seattle, Wash., have undertaken a number of tin can problems of a simple character. The articles made included funnels, match boxes, candle sticks, toothbrush holders, savings banks, flour scoops, dustpans, nutmeg graters and teapot stands. The difficulty of heat for soldering was overcome thru the use of a charcoal stove which proved very satisfactory and economical.

Vocational Training Wins. The Hutchinson bill which sought to reduce the age limits of children compelled to attend the continuation school, was defeated recently in the New York legislature. The bill would have reduced the age limit to between 14 and 15 and would have made part-time schools optional on the part of localities.

A Vocational Department. The Jefferson County (Ala.) board of education has established a vocational department at the Corner School, Birmingham. A four-room addition to the building is planned to house the department.

School Earnings Grow. More than $300 was recently added to the earnings of the Girls' Vocational School, at Newark, N. J., thru a sale of products of the school. In addition to this amount, about $50 was realized on left-over articles purchased by the students. The principal has turned in to the board of education about $3,000 for the school year, which represents the earnings of sales, filling of orders, serving of luncheons and catering.

PERSONAL NEWS NOTES.

Miss Lizzie M. Barbour of Brownville, Tex., has been employed as assistant director of industrial education for Texas. Her work includes the supervision of all trade and industrial classes for girls and women established under the Smith-Hughes law.

Mr. E. M. Wyatt has been appointed director of industrial education at Houston, Tex.

Mr. R. G. Yarrington teaches vocational woodworking in the Maine Avenue High School, at San Antonio, Tex.

Mr. L. W. Fox has been appointed director of industrial education at San Antonio, Tex.

The salary of Lawrence Parker, vocational instructor at Toledo, O., has been increased from $3,500 to $4,200.

Mr. R. E. St. John has resigned as president of the vocational school board at Green Bay, Wis.

Mr. James Killius, Director of Vocational Education at Johnstown, Pa., sends the Magazine a copy of the Johnstown School News. The entire publication is the product of the vocational department of the schools. The type for it was set on a linotype in the school printshop and the entire job was run on a Miehle cylinder press, just installed in the shop. The work was done by the pupils under the direction of Mr. W. F. Cleaver, teacher of printing.

Mrs. H. T. Woolley, Director of the Cincinnati Vocation Bureau, has announced her resignation, to take effect at the close of the school year. Mrs. Woolley will make her home in Detroit where her husband is now stationed.

Mr. R. W. Moore, Director of Manual Training at Seattle, Wash., has resigned to accept a commercial position.

Mr. H. W. Mulhollan, of the Broadway High School, has been temporarily placed in charge of the duties of Mr. Moore.

Mr. Nicholas Ricciardi has resigned as district officer for the Federal Board at San Francisco, Calif., to become president of the California Polytechnic School, at San Luis Obispo. Mr. Ricciardi is succeeded by Mr. Elmer L. Shirrell of Santa Barbara.

Miss Grace Price of Stevens Point, Wis., has been appointed teacher of home economics in the vocational school, at Fond du Lac.

Miss Marian Olbrich of Antigo, Wis., has been engaged to teach sewing in the high school at Harvey, Ill.

Mr. William V. Winslow has been appointed Supervisor of Industrial Arts at North Tonawanda, New York. His duties will begin September 1st and his work will include both drawing and construction thruout the grades and the high school. Formerly the Drawing and the Shop work were under two departments.

NEWS OF THE MANUFACTURERS

OFFER NEW LATHE.

The Standard Lathe Works, 2951-2961 Colerain Ave., Cincinnati, Ohio, manufacturers of the **"Standard"** Engine Lathe, are now offering to the school trade a moderate price lathe combining accuracy and simplicity with the highest quality of workmanship and materials. The manufacturers claim for this machine "Quality without frills." These lathes are ideally suited for school shops because they are devoid of intricate parts.

The **"Standard"** Lathe has been placed on the market to meet the demand for a machine without expensive quick change arrangements and the manufacturers say that they have succeeded in producing a machine that can be depended upon for high production with accuracy and durability, a tool of high quality at a moderate price.

Any reader of our magazine who is interested in purchasing a lathe for his shop should write to the Standard Lathe Works at the above address, and secure additional information regarding the mechanical advantages of the **"Standard"** Engine Lathes.

CHUCKS AND THEIR USES.

The caption of this item is the title of a comprehensive booklet recently issued by the Skinner Chuck Company for the benefit of apprentices, students and others interested in metal working and machine shop practice.

The author traces briefly the origin and development of chucks as an aid to metal turning and then takes up in detail the construction, operation and use of the principal types of lathe, planer, drill, milling, and special types of chucks. The descriptions avoid theory and technical engineering considerations and hold to practical, every-day information. Just a few paragraphs from the chapter on the "care of lathe chucks" will give a clue to the material in the booklet:

"While most modern chucks are made as skilfully as it is possible to make them, in order to protect the working parts from damage, it is essential that they be properly maintained and that they work with ease and certainty. Every chuck is a mechanical device, as it has movable parts that should be oiled and kept clean. When not in use it should never be left upon the floor nor under a machine tool where chips, dirt, dust and heavy oil can work into it. It should be placed upon a bench or shelf, where it will not be damaged, as indicated above, or by the careless dropping of a tool or a heavy weight upon it.

"When taking a chuck and plate off a machine lay it down with the face plate uppermost so that chips will not fall from the chuck into the threads of the face plate. It is a good idea to wipe chuck and face plate attached with oily waste, and cover to keep the threads clean and free from rust.

"All Skinner Chucks are made as mechanically accurate as possible. The nuts for the operating screws are hardened and these nuts and the operating screws are larger than is common practice. Moreover, the wrench that is provided with each chuck is of ample proportions to tighten the jaws so that the chuck will firmly hold the work, even when operating at maximum capacity. Large pipes or longer wrenches than those provided should never be used to try to tighten the jaws, because the wrench provided for that purpose will insure sufficient grip, and any extra strain is unnecessary and harmful to the chuck mechanism.

"The jaws should never be pounded with a hammer or a steel bar to try to force them in or out. The chuck properly handled and properly cared for should last for years, but no manufacturer can guarantee any mechanical product against abuse or misuse.

"Frequently chucks are used to hold oversized work. Of course, if this is done but occasionally, it may not damage or strain the chuck, but it is a poor practice at best and should never be done when it can be avoided. When the chuck is used to grip oversized work, care should be taken not to force the grip so strongly as to spring or break the parts.

"While it is more common for users to try to force chucks to carry oversized work, large chucks are frequently misused by trying to force them to hold pieces that are too small for them to grip properly. Just as severe strains can be put upon a chuck in this way, in trying too hard to force the jaws together, as can be put upon them by trying to force the jaws to grip work that is too great for their capacity."

School and College Directory

School and College Directory

THE STOUT INSTITUTE

NINE WEEKS SUMMER SESSION, JUNE 27—AUGUST 26, 1921

The following courses are offered in Summer Session, 1921:

VOCATIONAL EDUCATION—7 Courses

For directors and teachers of State and Federal Aided Vocational Schools

Administrative Problems
Citizenship for Vocational Schools
Organization of Home Economics
Principles of Teaching
Teaching of Vocational and Industrial Classes
Vocational Education

INDUSTRIAL ARTS—28 Courses

For teachers and supervisors of Industrial Arts and Manual Training in elementary and secondary schools, junior and senior high schools, and for Vocational School teachers.

Auto Mechanics I, II
Bricklaying and Cement
Drawing
- Architectural I, II
- Elements of Mechanical Drawing
- Machine Drawing I
- Machine Drawing II

Furniture Upholstery
Cabinet Making
Carpentry
Electrical I
Elements of Woodwork
Forging I
Forging II (Including Oxy-Acetylene Welding)
Foundry
Grade and Prevocational Woodwork
Machine Shop I, II, III
Millwork
Patternmaking
Printing I, II
Sheet Metal I, II
Woodfinishing
Woodturning

HOUSEHOLD ARTS—26 Courses

For teachers and supervisors of Household Arts, for dietitians and for institutional directors.

Chemistry
- Food
- Textile
- Qualitative Analysis

Color and Design II
Clothing I, II, III, IV
Costume Design
Community Hygiene
Cookery I, III, IV
Cookery V (Experimental)
Dietetics I, II
Dressmaking and Drafting (Adv.)
Food Analysis
Food Study
Home Marketing, Cookery and Sewing
Home Nursing
Household Physics
House Management
Institutional Management
Interior Decoration
Microbiology
Textiles

DEGREE AND DIPLOMA ACADEMIC WORK AND SCIENCE—18 Courses

For Stout two-year course graduates and others studying for the Bachelor of Science degree in Industrial Arts or Household Arts, and for those studying for the diploma.

English III
English IV
Home Economics
History, Industrial
History, Modern
Modern Industry
Materials of Construction
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Study Toy Making. A committee of teachers of the industrial arts at Cincinnati, headed by Mr. T. C. Moberley, has begun a study of the problem of toy making in industrial arts shops. The committee will report a definite plan for this work on May 15th.

A Patriotic Pageant. Dr. James P. Haney, director of art in the New York City high schools, has been asked to prepare a synopsis of a plan for the forthcoming pageant entitled "America's Making." A plan of teaching has been worked out in pageant form, which closely meets the requirements of the superintendent and requires few performers, few and inexpensive costumes and few teachers for directing the work.

The plan contemplates a number of "elements" or "episodes," each to represent the contribution of one country up to a maximum of eight or ten countries. The presentation will require four assemblies and the separate elements are to be presented at assemblies a week apart, or even a fortnight apart. The teaching is to be supplemented by correlated work in history, English and other subjects. Each element is to be in charge of a committee of teachers, who are to prepare the actors, costume and rehearse them in their parts. In the planning of the element, the teachers are to determine upon certain leading personages in history to represent the particular nation, and the teachers or pupils will prepare the speeches to be spoken by those personages summoned by the spirit of history. The spirit of history is to represent the speaker who summons the several characters and who gives the connecting link which binds the elements into a unit or whole.

Adjustment of vocational education work in Indiana public schools to conform with recent legislation and a beginning toward the administration of vocational rehabilitation training of persons injured in industry under a new law are to be undertaken by the vocational education committee of the state board of education, it was decided at a meeting of the board recently. W. E. Stone, president of Purdue University, is chairman of the committee.

The necessity of readjustment of the vocational work in schools came about because of the new law which provides the board with a state tax levy of one-half cent to replace the two-tenths of a cent levy. E. A. Wreidt, state vocational education director, told the board that the fund will have approximately $360,000 for the next school year and $410,000 for the year following. He explained that the receipts will be insufficient to elaborate on the present program.

Mr. Stone went further and said: "It means that no more schools can establish this work and the work some are doing must be cut down."

The board had requested the legislature to raise the levy to one cent. The law requires that the state shall provide half of the money schools expend under certain regulations in vocational work. The board will ask the state legal department for an opinion as to whether it may provide less than one-half and thus provide some state support for an additional number of schools.

The board authorized the committee to arrange for the selection of a state supervisor of vocational rehabilitation work in accordance with the new law on the subject. The law provides the board with $11,000 for the remainder of the present fiscal year and with $27,000 a year thereafter to put with a like sum of federal money for the rehabilitation of persons injured in industry.

The supervisor of the work will be an assistant to the state vocational education director. His salary will be fixed by the board subject to the approval of the governor.

Boards Free From Council Rule. The Supreme Court of Wisconsin, in reversing a decision of the Circuit Court of Dodge County, holds that requests of local boards of vocational education for funds are final and are not subject to review by local city councils. It was pointed out that the legislature had no intention of giving city councils power to change the requests of local boards, nor can they require the boards to make itemized reports of the way in which the funds have been expended. The decision was given to the school board of Beaver Dam which had asked for $14,361 and had been granted $5,000 by the city council.

Four-Year Vocational School. A four-year vocational school is planned for South Middletown Township. Esti-

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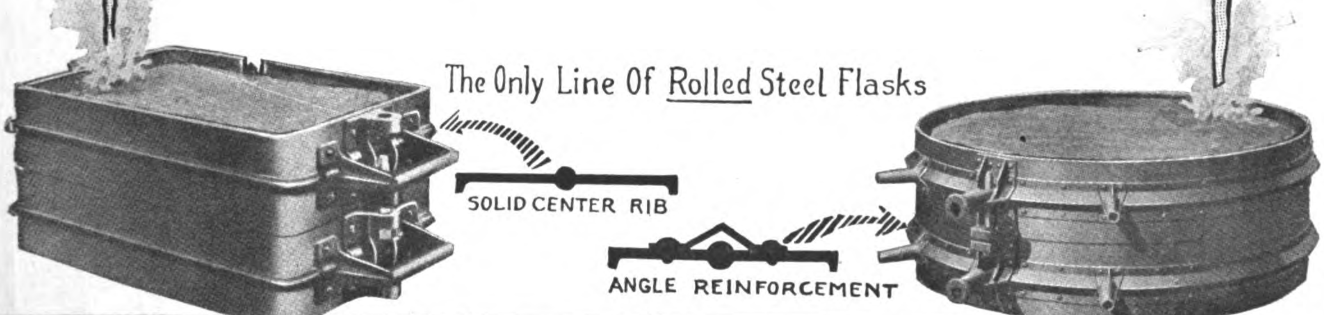

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INDUSTRIAL-ARTS MAGAZINE

Volume X JULY, 1921 Number 7

A Constructive Plan for the Organization and Administration of Junior High School Courses in Industrial Arts for Boys

Leon Loyal Winslow, Specialist in Drawing and Industrial Training,
State Education Department, Albany, N. Y.

SOME of the major aims of the industrial arts work in grades seven, eight and nine are the enrichment of the general curriculum; the acquisition by the pupils of a somewhat limited degree of skill in the handling of the typical industrial materials, tools and machines, and the developing of interests in industrial occupations, with direct value in educational and vocational adjustment. The junior high school is the connecting link between the elementary school whose purpose is general and the senior high school whose purpose is largely vocational. It receives boys and girls of thirteen and turns them over at fifteen to the senior high school for specialization within a somewhat restricted field. Junior high schools should serve the dual purpose of fitting pupils for senior high school and of assisting them in selecting an occupation. It is, therefore, desirable that as much experience of prevocational worth be included in all junior high school courses as it is possible to provide under the limitations of time.

Definition of Industrial Arts.

Industrial arts is manual training made broadly educational. It deals with the transformation of raw materials into finished products employing the necessary planning, drawing and construction and involving a sufficient amount of related information to make all of the activities engaged in, significant.

The Industrial Arts Project.

Since the teaching of industrial arts in the high school cannot cover effectively the whole field of industry but must concentrate on the problems which are of immediate or anticipated value to the pupils it follows that such teaching must function largely through the projects which the pupils undertake. *An industrial arts project consists of a complete series of lessons which have taken into account the pupil's development and the necessary subject matter, drawing and construction involved.* Subject matter is the thought side. It includes information relating to materials, tools and technical operations as well as cultural industrial information. Drawing includes design and the freehand and mechanical representation of form requiring instruction in orthographic projection and other working drawings including lettering, perspective sketches and sometimes isometric drawing. Construction includes the preparation and combination of materials to the end that a new product may result. Industrial arts will be interpreted to include all drawing and design which functions as a part of an industrial arts project.

The drawing included should provide ample instruction in art in so far as art is to be considered as a part of the various industrial arts courses. This does not mean that art should not be taught as a subject in the junior high school. On the contrary it should be taught to boys as well as to girls as a subject which is used continually by both in solving the common problems of life. Art should also form a most significant part of the courses in industrial arts for boys and home economics for the girls.

Nature of Handwork.

Handwork should always result from a definite purpose calling for it. Whether it utilizes drawing or constructing, or merely the mixing of materials, it should be undertaken solely for the purpose of general education rather than to meet immediate vocational needs. Selection of operations and of the products resulting therefrom should be made on the basis of the broader *educational* values, as opposed to the purely *training* values although the training values should by no means be ignored.

Nature of Subject Matter.

The subject matter should include such general topics relating to the trades and industries as the following: the importance of the occupation under consideration; conditions of employment; permanency of employment; opportunities for advancement; occupational diseases and health hazards, sanitation, etc. *Safety First* and first aid to the injured should be considered as a legitimate part of the related subject matter which should also include some of the intimately related science, mathematics, materials, history and Eng-

lish. Mathematics for example should be involved whenever a need arises for its use. Drawing and design in like manner should be brought into play as occasion demands. Instruction in the care of tools and machines is rightly considered as coming within the range of subject matter. The most conspicuous difference between the earlier forms of manual training and industrial arts lies in this emphasis placed in industrial arts on subject matter.

It has been recommended that from fifteen to twenty per cent of the time devoted to industrial arts courses be given to the immediately related subject matter. This time should preferably be taken from the beginning of each period. *One subject matter period each week may well be substituted for two periods of shopwork provided a satisfactory textbook is used.*[1] The word, text, is defined to mean a book relating to the subject matter of the course in which it is used, to be purchased by or furnished to each pupil registered for instruction. When a special subject matter period is provided it is obvious that less time will need to be given to this phase of work in the shop course. A few minutes each day should be set aside in each shop period however for pointed thoughtful discussion and recitation. There is a kind of related information that can be presented effectively only by the shop instructor in the shop.

The Time Element.

There are two types of schools which must of necessity be considered in any state-wide scheme for intermediate or junior high school industrial arts. These are as follows:

(a) Schools in which the boys are required to spend 240 minutes or three 80 minute periods a week in industrial arts (drawing and shopwork) as a part of the general school program.

(b) Schools in which the boys specializing in industrial subjects are required to spend 400 minutes or five 80 minute periods a week in the shop and 200 minutes or five 40 minute periods a week in the drawing room.

(In institutions offering this special course provision should be made also for pupils not in the course. Such pupils may be allowed to receive instruction in industrial arts for 160 minutes a week or two 80 minute periods, or they may devote 240 minutes a week to industrial arts. See a, the paragraph above.)

A Tryout Scheme.

It is recommended that the socalled practical work for the intermediate school period should lay special emphasis on educational and vocational guidance. The instruction should acquaint the pupils with the advantages and disadvantages offered in the various industrial lines.

The pupils should be taken to visit manufacturing establishments, drafting departments, buildings in the process of erection, and other places where industrial work is being carried on. They should also be required to visit the junior high school shops if there are such. A schedule for these trips should be arranged in advance and the class should determine in advance the purpose of each visit. The pupils upon their return should be required to make a special report covering their findings.

Teachers of seventh grade boys must render all possible assistance to the pupils who find difficulty in making a choice between the general, industrial, commercial and agricultural courses. They should become in a sense educational advisors to their pupils. School records will furnish valuable data in determining a pupil's inclination toward certain kinds of work. Success in mathematics and drawing will often indicate an aptitude for industrial subjects.

The Planning of Courses.

At the beginning of each school year old courses should be reconstructed and new ones planned largely on the basis of an annual investigation of conditions obtaining in the schools and in the community outside. This investigation would point the way to a permanent articulation of industrial arts with actual industrial life.

A course in intermediate industrial arts is defined as an organized body of educational instruction prescribed or approved as such by the local school authorities and carried on for at least two 80 minute periods or the equivalent a week throughout the year.

The course should be organized about typical processes or jobs arranged in order of difficulty of execution.[2] Useful *products* should be selected to furnish experience in performing the necessary processes. Subject matter should grow out of the shop activities. When drawing is taught as a separate subject it should always be correlated with the construction work. It goes without saying that when drawing is taught as a part of the shop course it forms an integral part of it. Products should be constructed from the pupils' own drawings or blueprints, in either case.

In arranging a course the processes are listed first. These processes will determine the type of product to be assigned. Products should be simple and should demand instruction in the exact principles or processes which they are chosen to clarify or to emphasize. Products may be (a) complete in themselves, (b) parts of complete structures, (c) parts of class or community structures, or (d) drawings and designs.

All good outlines of instruction in industrial arts provide for:

1. Listing the processes or jobs common to the type of work.
2. Arranging the processes or jobs in an instructional order determined by their relative difficulties.

[1]One subject matter period should serve at least four single or two double periods of shopwork. A period is 40 minutes in length.

[2]Another plan, one which has considerable in its favor consists of beginning with the subject matter rather than with the jobs. It is much more difficult to carry out.

3. Listing a series of products (practical and useful if possible) calling for the use of the processes or jobs mentioned in 2. (This list will include drawings and designs as well as constructions.)

4. A description in outline of the operations (operation sheet) involved in the carrying to completion of each product.

5. Subject matter including the intimately related mathematics, theory and science and economics involved in industry study and in the construction and drawing, arranged in instructional order.

Outlines of instruction should be written in advance and a copy kept at hand for continual reference.

The diagram which follows will be found helpful to teachers in planning their outlines of instruction. It should first be worked out on a large piece of paper. When complete it may be easily reduced to manuscript form.

Type of Work.
(As Woodworking, Metalworking, etc.)

Processes or jobs	Products	Subject Matter

Suggestive Program.

Teachers will need to supplement their outlines of instruction by operation sheets prepared in advance of the daily lessons.

Sequences of Courses.

The instruction in all types of intermediate grade work should be designed to meet the general needs of the community for intelligent citizenship. The boys should be taught to think clearly along mechanical and industrial lines. Industrial insight of a general nature, understanding and appreciation and skill are the ends to be sought.

Courses of instruction should be organized and administered as a part of the regular intermediate grade scheme. In choosing the courses it is desirable to select the industries of the community which offer the greatest vocational opportunities and to plan the sequences accordingly. Among the trade groups best adapted to instruction in schools may be mentioned the metal trades, the building trades, the electrical trades and the printing trades. In one type of vocational school (general industrial) these groups of trades would be so presented as to enable the pupils to acquire a sufficient amount of usable experience and skill to make their immediate entry into industry possible. In the other type of vocational school (unit trade) the pupils should be prepared upon graduation to enter a specific trade rather than a group of trades. In both types the pupils would be required to devote half of each day to practical work which must be conducted on a productive basis. This time requirement alone would make it impossible for industrial-arts courses to qualify as vocations. There are other reasons why industrial arts education work cannot pass for vocational education. Among these are its dominant cultural aim, its limited contact with the trade, and its still more limited equipment.

From the above it will be seen that instruction in industrial arts in the common school is quite different from training in an industrial occupation in a vocational school. In the vocational school, courses are organized about groups of trades or about a single trade, as the case may be. In intermediate industrial arts, instruction is organized about certain types of work each involving their own processes, products and subject matter.

Junior high schools completely equipped with several shops, for offering a sequence of industrial courses should have no difficulty in providing for at least six types of work, while schools in the smaller communities equipped with a single shop may find it difficult to offer more than three types of work. The following distribution of the various types of work over the three years of the intermediate period is suggestive:

Grade VII. Printing.
Woodworking.
Grade VIII. Electrical Work.
Concrete.
Grade IX. Metal Work.
Automobile Mechanics.

Schools now offering courses in woodworking only may find it desirable to branch out gradually into other lines of work. Printing might be added during the present year. Next year concrete could be introduced, followed a little later by a course in electrical work. It may be deemed expedient by some of the smaller communities to confine the pupils to three types of work, one type for each of the three years. In no case should there be less than three types of work planned for the three-year period.

Summary Outlines of Courses.

The possibilities for worth-while construction opened up by such a scheme for industrial arts are great whether the number of types of work is three or six. If fewer than six types are considered the study of the fewer types will be made more intensive. The following brief outlines will indicate the range of subject matter which may be offered in connection with each of twelve important types of work:

Type of Industrial Work.	Subject Matter Relating to
1. Printing.	Composing, presswork, binding, engraving and lithographing.
2. Woodworking.	Bench woodworking, carpentry, machine woodworking, cabinet and furniture making, varnishing, painting and finishing, upholstering.
3. Painting and decorating.	Wood finishing. Interior finishing (floors, trim, ceilings, walls). Exterior work (house painting), automobile finishing, sign and scene painting.

4. Concrete.	Footing and foundation walls, sidewalks, curbs and gutters, troughs, posts, steps, boxes, culverts, roads and engineering work.
5. Brickwork.	Wall and corners, manholes, foundations, panels, piers, semi-circular arches, chimneys and fireplaces.
6. Metalworking.	Blacksmithing, machine shop, toolmaking, patternmaking and founding, structural steel work, sheet metal and automobile work.
7. Drafting.	The work of the draftsman and designer. Engineering and machine work and architecture. Orthographic projection including freehand working sketches and mechanical working drawings. Dimensioning and lettering. Drawing to scale. Titles, bills of material, notes and specifications. Penciling, tracing, inking and blueprinting. Isometric and cabinet drawing and perspective or pictorial drawing. Details and assembly drawings. Plans and elevations sheet metal drafting involving intersections.
8. Industrial Art.	Textiles, wall paper, jewelry, ceramics, furniture, architecture, machinery, illustration involving freehand and mechanical rendering. Pencil, charcoal, crayon, pen and ink, water color, oil color.
9. Electrical Work.	Related elementary science. Light, power and signal wiring, maintenance, storage battery work, automobile work, light and power work including general station work, switchboard operation, line construction, meter work, telephone and electric street railway work, electrical manufacturing.
10. Textiles and Clothing.	Carding, spinning, weaving tests for wool, cotton, linen, silk, bleaching and dyeing, printing and tailoring.
11. Baking.	Bread and biscuits, cakes, pies, crackers, candies.
12. Automobile mechanics	Two cycle and four cycle gasoline engines. Elements of ignition and lighting system for automobile gas engines for trucks and pleasure cars. Chassis, frame, axles, wheels, steering gear, transmision brakes.

Space will not permit here of an exhaustive treatment of the subdivisions suggested above. The work should be covered by shop talks and demonstrations if it is impossible for the pupils actually to engage in all of the work.

A Suggestive Program.

A possible shop and drawing program for the special students in industrial arts in a typical junior high school equipped with six shops (one drawing room included) is given below. This scheme offers a half year's course in each shop subject named. It recognizes in printing an excellent study for the transition period from the general work of the elementary school to the more specialized work of the junior high school. All of the instruction suggested in the program will be handled by the industrial arts teacher in the shop or in the shop, subject matter and drawing rooms.

The teacher of industrial arts should be a graduate from an approved high school who has pursued a two-year special teacher-training course in industrial work. Men possessing the above qualifications who have in addition had some practical experience in a trade are to be preferred to those possessing no trade experience. And yet trade experience is not to be made the most important criterion in selecting men as instructors. The ideal teacher of industrial arts is the individual possessing qualities which make for efficiency in shop management. He must be a man of broad sympathies and of refinement as well as a master of his special field. General culture and resourcefulness are more to be desired than skill in a trade although skill must be considered as an important factor.

Schools equipping for industrial arts should make provision either for a two-room or a multiple-room layout.

If a *two-room layout* is chosen it should consist of a shop with tool and supply-storage closet adjoining and a drawing room with storage closet adjoining, the drawing room serving the purpose also of a recitation room. Both shop and drawing room should be large enough to accommodate the necessary benches, cupboards, machinery, supply racks and other equipment needed. The supply closets should be sufficient to contain full length stock. If the drawing room is to be used for drawing exclusively the shop should be large

Suggestive Program.

	Type of Work	Subject Matter	Drawing	Product
Grade VII		The significance of the work as revealed by science mathematics, history, English.		
1st half	Printing		Page layout, dummies, poster designs, sign painting.	
2nd half	Woodworking	Excursions, investigations and assignments covering such topics as the following hygiene involved.	Furniture design, architectural details.	
Grade VIII		Significance of trades, permanency of employment. Opportunities, conditions of employment. Salary opportunities. Labor organizations, mental and physical requirements.		Products including to motivate and make clear the subject matter together with drawings and designs to aid in constructing and to motivate subject matter.
1st half	Electrical Work		Diagrams, wiring layouts.	
2nd half	Concrete		Architectural drawing. Topograpical drawing. Perspective sketches.	
Grade IX		Study of materials, tools and machines, technic of the work involving instruction in drawing and design and in combining and arranging materials in construction.		
1st half	Metal Working		Projections of products. Perspective sketches.	
2nd half	Automobile Mechanics		Diagrams. Drawings for automobile parts.	

enough to include a section of floor space set aside for recitation purposes. This space should be sufficiently large to accommodate a teacher's bench, blackboard, bookcase and individual seats for all the pupils. The drawing room should always communicate directly with the shop.

If a *multiple room layout* is chosen it should consist of one or more drawing rooms and as many shops as the size and the needs of the community require. There should be one tool and supply storage closet for each shop or one closet opening into each two adjoining shops. In the case where several shops are maintained one supply room may serve two shops provided it opens into both. The shops should be arranged in units wherever this is possible, a metal unit, an electrical unit, an art unit, etc.

The following minimum requirements apply to all industrial arts shops and drawing rooms: (a) Floor space, for shop, 1,600 square feet; for shop with space for recitation, 1,650 square feet; for storage and supply closet, 100 square feet; for drawing room, 1,200 square feet; (b) Partitions: for walls separating all shops and drawing room partitions that can be moved easily if necessary should it be deemed advisable in future years to readjust the original layout; (c) Light and power: daylight from one side if possible. Large windows placed close together as in factory construction. Individual electric lights for all benches and machines if other system of lighting is not adequate. Outlets for all electrically driven machines. Wall sockets for lantern, and daylight proof curtains in all rooms used exclusively for art instruction; (d) Blackboard: Each shop and drawing room should have 80 square feet of blackboard; (e) Corkboard: Each drawing room should have not less than 80 square feet of corkboard.

COURSE IN BUILDING CONSTRUCTION

S. O. Werner and F. E. Lawshe, So. St. Paul, Minn., High School

BUILDING Construction as a trade course, in a general industrial school, has been offered in So. St. Paul, Minnesota, for the past three years. During each of the three years a small frame dwelling has been erected by the students as a part of the course of instruction.

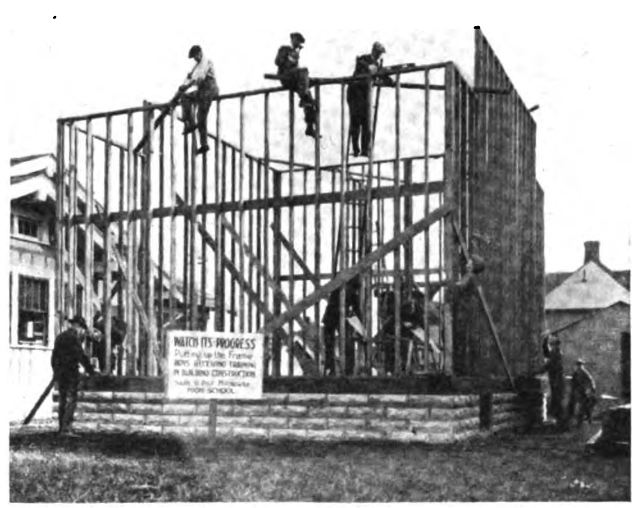
A description of the methods that have been used in conducting these classes may be of interest to those who are offering similar trade courses or to those who are contemplating offering courses in building construction, either in all-day or part-time classes.

In tracing the development of the teaching of carpentry in our trade schools, the subject seems to have passed through four stages since it was first introduced. Briefly the four stages are:

1st. Building small models of houses or barns.

2nd. Making parts of a building, as window and door frames with full size materials.

1. LAYING THE LINING FLOOR.



2. PUTTING UP THE FRAME.

3rd. Building a section of the wall of a frame building somewhat reduced in height in order to show the method of construction.

4th. Constructing a completed building as a commercial product. We have based our course of instruction on the last method—constructing a completed building as a commercial product.

Description of the Course.

The length of the course covers two years and includes besides rough carpentry and interior finishing, the elements of several other trades, such as concrete work, inside wiring, brick laying and painting. The course is open to boys who have completed the eighth grade and who are over 14 years of age.

The school day is divided into two parts: one-half the day being devoted to manipulative work on the job, and the other half to related and academic instruction

3. RAISING THE RAFTERS.

in the classroom. With two groups of boys, two teachers devote all of their time to manipulative and related instruction.

It is the aim of the course to give to boys who have shown an interest in some branch of the building trade through try-out courses, training in building construction by actual experience so that they may go out after two years of training, better fitted to enter upon an apprenticeship in one of the building trades.

Financing the Project.

In order to carry out the productive part of the work, it seemed necessary that the course in building construction should follow as nearly as possible the method used by a general building contractor. Several plans presented themselves as possible means of financing the project. The one that we have found to work successfully has been to enter into an agreement with an outside party who desires a building erected, proposing that the school through its building construction classes do all of the carpentry work, the inside wiring and the outside painting, without financial remuneration. The outside party assuming the obligation to pay all bills for material and supplies.

After the first year we have had more applicants wishing to take advantage of our offer than it has been possible for us to accept.

How Carried On.

One of the first things required, preliminary to the building of the house shown in the accompanying illustrations, was the erection of a "ten by fifteen" sectional tool shed—made sectional so that it might be easily moved from one job to another.

This "shed" was fitted with a carpenter's bench and tool lockers. Each boy was required to furnish his own cross cut saw, hammer, try square and apron. These tools were of approved make and were regularly inspected by the instructor to insure good care. All other tools necessary were supplied by the school and kept in a separate locker and checked out as needed.

In building a house the work or series of jobs do not come in the order of their "doing difficulty." This was true at the very beginning. The actual carpentry instruction for the boys did not begin until the posts and beams that support the first floor joists were in place. Since this job required a degree of accuracy in measuring and leveling, the instructor—with the help of one or more of the older boys—did this job. However, from this stage on, all of the carpentry work was done by the boys.

A permit was taken out by one of the instructors for doing the inside wiring which, after completion, was inspected by a city inspector. In connection with the inside wiring, the proper placing of light and switch openings was discussed and afterwards drawn in on the plans. The right amount of candle power for each room was calculated, circuits were planned, materials estimated and the code requirements as to installation were thoroughly studied.

A part of the time was used for field work which consisted for the most part in visiting factories where building materials were manufactured, building and trade shows, planing mills and new buildings. The classes were made to feel responsible for knowledge gained and were given tests to cover this work as well as the other subjects.

It has been our practice to have complete sets of working drawings for each of the buildings. The boys were instructed to interpret freehand sketches made by the instructor to illustrate details not shown on the blue prints.

All the material as it arrived on the job was

4. SHINGLING.

checked by the boys. This helped to familiarize them with the kinds of building material, their names and uses, as well as training them in rapid estimating of lineal and board measure. The figuring and comparing of the amounts on the bills, against that received on the job, was made a classroom problem.

The Related Subjects.

The course in blue print reading covered twenty lessons and was given out in the form of typewritten lesson sheets, together with the blue prints for each lesson. All tracings for the prints were made by the instructor and the prints themselves were made by the students during the class periods. This proved a popular course and the actual making of the blue prints by the pupils themselves, was a good way to hold their interest.

5. REAR VIEW OF FINISHED BUILDING.

The theory of mechanics and strength of materials was taught by means of a textbook, making the subject matter of the book follow as closely as possible the actual work of construction.

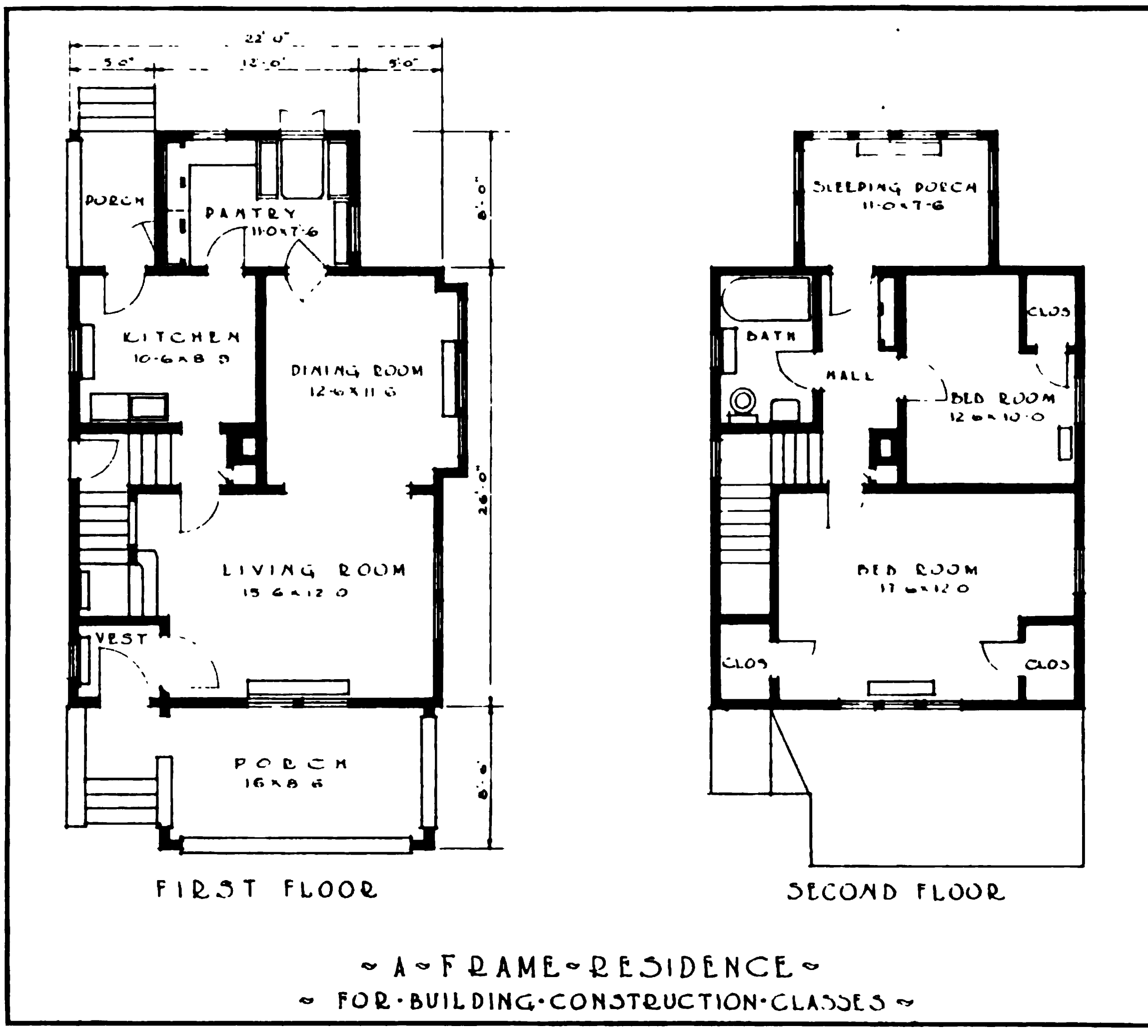
Applied mathematics presented no difficulties from the standpoint of maintaining interest. It consisted of problems in estimating materials from foundation to roof. Neighborhood problems were brought in from time to time,—such as estimating material for a new porch, cellar stairs, hen house, reshingling a roof, etc. The boy that brought in the problem was always proud to carry back the answer and, of course, was made to see the commercial value of the work he was doing. It was necessary from time to time to go back and review some parts of arithmetic, particularly decimals. fractions and square root. This was only a minor difficulty; however, and on the whole, the boys were very eager and intensely interested in this branch of the work and would often volunteer to take unfinished problems home with them.

These three subjects were, as a rule, covered in the first year. Added interest was created by giving over the class period on every Friday to discussions on subjects outside of regular school work. Technical and trade magazines were kept on hand and the boys were encouraged to read them at odd times. These usually founded the basis of discussions and anything from marbles to the Einstein theory of relativity was not barred. If a discussion lagged or was slow to start, the instructor would fill in with a timely word of suggestion.

Special Methods of Instruction.

The method of instruction, in most cases, was that of the demonstration method. In some cases, however, we found that the description method, combined with the demonstration method, was desirable.

One means of keeping the boys interested when there was any amount of repetitious work, was to create competition between individuals, groups in a class, or between classes. This was best carried out, for instance, in laying the lining floor, or nailing on sheathing, and it was found that this competition was invariably assumed by the boys themselves. It is, perhaps, the instructor's greatest problem at any time to know how to encourage fast work and, at the same time, to have the



FIRST AND SECOND FLOOR PLAN OF THE BUILDING.

work done well. Another effective method of stimulating best efforts on the part of boys, was found in some cases, to have them work in pairs. Even when this had been accomplished, it was found advisable to make a change of the groups for a short period of time.

Every boy has a natural desire for certain kinds of knowledge to be gained in his own way; usually by observation and asking questions. There is no reason why he should not be given the opportunity in a trade school. The instructor, of course, must have a large general fund of knowledge and must, oftentimes, go out of his way to keep posted on the various subjects his class might be interested in. This, however, did not assume the proportions of an added burden, but developed into a fascinating game played by pupil and instructor with equal zest. Pupils were eager for knowledge and the instructor, filled with a new stimulus for dispensing knowledge, gave forth his best efforts. We have here the ideal condition under which knowledge should be gained and what a bright, little spot this grew to be for both pupil and instructor!

After the above method was successfully launched, there were fewer "drop-outs" the second year.

Conclusions.

In as much as it is very desirable that the house be "enclosed" before the cold weather starts, the project chosen should not be too large. A small house does not require as much scaffolding as a two-story building thus minimizing the element of danger. In either case however, as a precaution, it is advisable to have a guard rail built at the outer edge of each platform.

One of the greatest difficulties experienced in conducting a class in building construction with a mixed group of boys of varying ages, natural ability and experience, is the problem of keeping the less efficient ones busy. This is true —not only from a standpoint of production of commercially passable products — but also from a standpoint of efficient teaching. It is advisable, in order to eliminate this difficulty, to construct two houses, thus making it possible to place the efficient boys on the more particular work—such as inside finishing—and the less efficient boys on the second project to do the rough carpentry work.

Since every house must be a "commercial product" the work needs close supervision. When the ages of the students range from fifteen to eighteen, with a probable average of fifteen and a half years for the group, there should not be more than ten pupils in a class. Aside from the difficulty of teaching and that of disciplining when the classes are large, the work is not varied enough to keep the boys interested. The time allowed for

manipulative work should be in one period, rather than broken up into two sessions.

The house should be carefully planned to eliminate complications and should be built to weather the climate for which it is intended. It should be simple and pleasing in design, so that it will be a credit to the community where it is built, and as such, a monument to the boys who built it!

Summary.

One of the questions that naturally arises is in regard to the charge made. Upon careful inquiry both at the school and from individuals who have had work done, this has never been challenged. The extra fifteen per cent is necessary on the part of the school because of certain accidental breakage and natural wear. The instructor insists that students are quite as careful about careless breakage as under the old system where the pupil was required to replace tools if he accidentally broke them. Schoolmen of experience and also practical men realize that many pupils are unable to replace breakage, particularly when it is not entirely their fault, and without question this practice often leads to dishonesty.

Another question that naturally occurs is whether or not the garages object to the schools doing repair work, thereby taking work away from them. The answer to this is that when compared with the business of some twenty garages in Everett, the work turned out by the Automobile Gas Engine class even in a whole year is of no consequence.

In order to provide a graphic representation of the organization from the school board down, Fig. 4, has been included. This shows how the work is divided up and where the responsibility is placed. The success of this plan lies in the fact that it is founded on "team work" and those participating are given certain authority and held responsible for definite results.

Shop cards, daily time cards, etc., in addition to the business record system cards, are kept by the student workmen.

Organization and Administration of a Continuation School

E. M. McDonough, Acting Principal, Boston Continuation School

(CONCLUSION)

Instruction.

THE instruction given in the continuation school is naturally divided under three captions: First, vocational; second, prevocational, and third, general improvement. Seventy per cent of the minors attending continuation school in any large eastern city of the United States elect prevocational training, twenty per cent choose general improvement instruction and ten per cent pursue trade extension and trade preparatory courses. The instruction in all the courses offered is determined largely by the following factors which affect both the content of the course of study and the method of instruction:

First, attendance four hours each week, forty weeks per year, with the interval of a full week following each attendance.

Second, variation in previous academic education of the pupils. Some have only completed the sixth grade, while others have completed two years of high school.

Third, the noticeable difference in pupils from the same grade or school since some have obtained previous prevocational instruction in prevocational and trade schools.

Fourth, the initial entrance date into the continuation school which is determined entirely by the day the child procures an employment certificate, regardless of the school year.

Fifth, the entire student body are undergoing the unusual physiological and psychological changes peculiar to adolescence.

Arranging the curricula of the school to meet the specific demands of instructional progression in any given course is no easy problem. The solution of the problems presented in instructional, progressive part-time courses depends entirely upon the division of the subjects taught into class and individual instruction. Civics, hygiene, and commercial geography should be taught as classwork, since the subject matter naturally adapts itself to such instruction. Mathematics, English and the instruction given in all trades and commercial subjects should be entirely individual founded upon the previous scholastic training of the student and devised ingeniously to meet the specific demands of progress in the trade or commercial vocation which the candidate is pursuing.

The short-unit lesson is best suited to the instruction given in the part-time school. Owing to the brevity of time available for instructional purposes, shop projects are selected of a commercial character on which consecutively progressive commercial operations can be performed in from one to three unit lessons. As far as possible each lesson should constitute a unit in itself. A shop progress card on which each individual's progress is noted both on stipulated projects and in manipulative skill should be kept by each trade instructor.

The short attendance periods prevent the utilization of productive shop methods employed by trade schools. Instruction should always be given precedence to production, and every project or operation should be discarded as soon as its educative possibility is exhausted. In the last analysis the education of the child

should be paramount to the productive feature of the child's employment. This norm we have striven religiously to adhere to not only in our relations with the children and their employers, but also in the instruction in productive shopwork given in the continuation school. We teach the child only those operations which are consecutive and instructionally progressive in contra distinction to operations which from a standpoint of production would bring a monetary return to the school.

It is the boast of many trade schools that the production of the children pays partly for their education. We do not subscribe to this false philosophy in education and do not believe that the community is willing to impose on these children the obligation of paying for their education at the expense of exploiting their production.

Graded instruction sheets arranged according to difficulty should be employed in all academic instruction, especially in shop related work. Individual instruction will thus become a possibility and the individual child will be stimulated to progress and efficient work in his desire to excel. Arithmetic and English instruction clothed under the guise of related interest factors becomes animated and is eagerly pursued by the students. A pupil in the continuation school is interested in the postoffice department, savings banks, labor unions, and the opportunities open to employed children for promotion in the industrial world; and on the other hand would not be interested in Christopher Columbus nor George Washington, except during the weeks of October 12th and February 22nd. These children are intensely interested in Edison, Theodore Roosevelt, Woodrow Wilson, Hoover, Henry Ford and other men of the modern world who have contributed and are contributing immeasureably to the advancement of civilization and democracy.

There should be small classes in all part-time school work because of the individual character of the instruction given and also because of the visitor work which is essential to efficient continuation school education. The maximum number of children in all general classes should be 22 pupils per teacher and in vocational classes eighteen pupils per teacher. Teachers should work in teams, one trade and one academic teacher, or two academic teachers constituting a team according to the character of the group to be instructed. In general improvement classes each team of teachers is held accountable for the attendance, instruction and follow-up work of 220 pupils weekly. In prevocational and vocational classes each team must account for 180 pupils weekly.

Typical program of instructors:

	Monday Hours				Tuesday Hours			
	8-10	10-12	1-3	3-5	8-10	10-12	1-3	3-5
Machine shop work.	2		2		2		2	
Academic		16		16		16		16

Wednesday Hours				Thursday Hours				Friday Hours			
8-10	10-12	1-3	3-5	8-10	10-12	1-3	3-5	8-10	10-12	1-3	3-5
	2		2		2		2	2		2	
16		16		16		16			16		16

One teacher should be allowed for each 300 pupil hours of attendance weekly or 60 pupil hours of attendance daily. Teachers should be required to report the number of individual pupils attending each week, in order to facilitate the transfer of new pupils and to enable the director to anticipate consolidations and eliminations of classes when necessary. The organization of the different courses in a continuation school is dependent upon the numerical enrollment, which in turn is dependent entirely upon the economic law of supply and demand operating in industry. Business prosperity and depression is therefore measured by the enrollment in the school. Flexibility in organization in order to enable the administrator to consolidate and eliminate classes whenever necessary, and inaugurate new classes demanded by industrial conditions is imperative. A continuation school should have a head of division for each 1,500 pupils. The duties of this head of division should be administrative and supervisory. The direction of all placement and vocational work, supervision of teachers, and maintenance of cooperative relations with employers and parents should be the functions of these division heads. Rigid economy should be practiced in ordering supplies for all departments and in the utilization of the various materials used for production. The cost of Continuation School instruction per capita is approximately $15, in comparison to $85 for high school instruction and $45 for instruction in elementary schools.

Vocational Guidance and the Employment Bureau.

In addition to instruction invaluable vocational guidance and counsel can be given in the part-time school. This school is bridging over the transitional period between theoretical school life and the practical life of the business world and presents unusual opportunities for vocational direction and placement. An efficient employment bureau should be established in every Continuation School, for the vocational guidance given is particularly potent coming as it does at the crucial moment in the lives of these adolescents. Juvenile delinquency and non attendance at school can be reduced immeasurably through the operation and counsel of the employment department as it is a well known truism that an idle child is mischievous, whereas a working child is too busy for mischief. An exceptional opportunity is presented for pointing out the mistakes and failures which these children make in securing employment and their reason for discharge from work. At the moment when the impression of their mistake is especially acute, vocational guidance which points out the error and the obvious remedy, becomes extremely practical and beneficial. The injunction "Strike while the iron is hot" can be obeyed literally in all part-time instruction. Vocational guidance is one of the functions which the Continuation School is performing and consequently is rendering a service to the community in retaining and guiding these children through the critical period of adolescence

which occurs concomitantly with their severance from the conventional schools and entry into the industrial world.

Unemployed Children.

Children temporarily unemployed have the option of returning to the conventional school or continuing at the part-time school during the interval of their unemployment. If they elect to remain at the Continuation School they must attend class 20 hours per week while unemployed, and report daily to the Employment Bureau until a new position is procured for them. Children attending the out-of-work class are given instruction designed to increase their vocational information and are taught the value of the industrial and civic virtues of honesty, obedience, neatness, courtesy, punctuality, initiative, faithfulness and loyalty.

Blind Alley Employment.

The Continuation School through the guidance of the Employment Bureau is constantly urging the children to avoid blind alley employment and to better their status in the working world. The initial wage seems to be the lure which attracts these pupils and incites them to reckless choice of occupations as well as thoughtless abandoning of employment which offers opportunity for progression. This restlessness is one of the natural tendencies inherent in the child during the adolescent period and therefore must be controlled and guided as far as possible for vocational ends. That there is such a thing as the deadening influence of automatic work, that the labor of children is exploited and that there are "blind alley" and enervating jobs, is indisputable. While it is undoubtedly true as some educators will contend that the industrial qualities and character formation which can be developed in any position are equally valuable regardless of the type of position employed as a means to an end; still it is also true that there are positions in the industrial world which give no opportunity for advancement per se and which offer no avenue of escape from mental and physical fatigue which is deadening and positively non-educative. To guide these children out of the labyrinth of various employments into that job for which they are best fitted and out of the present lucrative employment which offers no advancement to a position less promising at the beginning, but more progressive and developmental in the future, is one of the aims of part-time education. How well this aim is being attained depends upon the eternal vigilance of the part-time instructors and the fund of vocational information which is imparted in part-time schooling.

Housing.

Continuation-School classes should be housed in central buildings situated near the business district, where the employed children work. The Boys' Division and the Girls' Division should be conducted in separate buildings. Classes are sometimes conducted in factories, mercantile establishments and retail stores in which the use of a room for instructional purposes is given to the city where the school is established and the teacher is supplied by the school authorities. These classes are a great saver of time and suit the convenience of employers inasmuch as they are conducted at the place of employment. They fail however to give the prevocational opportunity which is one of the functions of the part-time school and are not the best form of organization since instruction is sacrificed for expediency. A separate building for continuation school work and not scattered classes in various high school and elementary school buildings is vitally necessary for the efficient administration of a part-time school. The importance of continuation school education demands a director whose full time should be given to the solution of the pressing problems peculiar to this type of school. To attempt to impose these duties upon the already overburdened elementary and high school masters will merely result in the continuation school problem becoming a side issue, receiving the time and attention of the director only after his daily problems are ended. There are some who delude themselves into imagining that part-time education is not as important as the other traditional schools. The fact is that part-time education is equally important with elementary and high school education and should be given an equal place in the educational systems of America. Continuation schools are educating that proportion of the population who should have an equal opportunity to share in the benefits of the state in which they are living. "Who shall decide the drawers of water and the hewers of stone?" What justification is there for presupposing that those who enter employment because of poverty should be precluded from all educational opportunity in the state. Because a child is a failure in the elementary school or high school, due to the fact that the theoretical instruction of the average school does not appeal to him, it does not necessarily follow that this child will be a failure in life. The time has come for our schools to give that equality of opportunity which is characteristic of America and to all the inhabitants of the state—to give each child the opportunity to develop that which is best in him regardless of whether he still continues in the regular schools or procures employment and attends the part-time school.

Instructors.

Instructors are differentiated into vocational or trade instructors and non vocational or academic instructors. One trade and one academic teacher constitute a team in all pre-vocational and vocational classes. Trade instructors teach 28 hours per week and spend four and one-half hours in the upkeep of the shop making a total of 32½ hours weekly. Academic instructors are assigned to 20 hours of teaching and are held responsible for twelve and one-half hours each week of follow-up work. All vocational instructors are journeymen in their respective trades and have had at least

eight years of trade experience before qualifying as instructors. Academic teachers are graduates of an approved college or of an approved normal school and have had at least two years experience as teachers previous to entering the employ of the Continuation School. All instructors (trade and academic) are required to satisfactorily complete a course of training under the caption "Theory and Practice of Continuation Schools" conducted by the Massachusetts State Board of Education prior to their appointment as teachers. It requires at least two years for the average teacher to gain a mastery of the problems peculiar to part-time instruction and thereby attain their best efficiency as an instructor. In addition to the knowledge of the special problem in continuation schools which is a prerequisite for all instructors, part-time education requires a teacher of unusual vision, understanding of the adolescent, a highly defined sense of proportion, resourcefulness, imagination, sympathy, and all of the other qualities required in the most able exponents of the teaching profession.

Attendance and Non Attendance.

Absence from the continuation school must be made up. That is, each pupil who has failed to attend on his assigned day, unless he can furnish a certificate from a physician certifying to his illness, must report on some other day during the week and make up the schooling lost through absence. This requirement is in conformity with the state law which requires these children to attend at least four hours per week during their period of employment and twenty hours per week while unemployed. The employment certificate under which the child works forms an effective weapon to compel attendance. If a child persistently refuses to attend school his employment certificate may be revoked. Employment certificates are never revoked. The threat to do so is sufficient. When a child has been absent for two consecutive sessions without excuse, he is classified as a truant and the attendance department investigates the case. These children suffer much through illness and accident and frequently change their home residences. These conditions cause temporary absence from school. Attendance in the Boston Continuation School for the last school year 1919-1920 was over 96% and when it is considered that this included the entire enrollment of the school comprising 5,300 different boys and girls each week, this remarkable percentage of attendance can be appreciated.

Records.

Schooling facilities afforded to so many thousands of employed children entail the keeping of a large number of records and the expenditure of a great amount of time in clerical work. Accuracy in records is essentially important. One of the problems in Continuation School organization is to reduce this clerical work to a minimum. When a child is absent from school a notification postal card is immediately sent to the pupil's employer and also to his parent. An envelope record file is kept in the school office and each pupil has an individual envelope in which is kept the industrial and school record of the pupil. Information gained by the teachers in their follow-up work completely summarized on follow-up record blanks eventually are filed in these envelopes as are also the scholastic marks given to the pupils in their school work. These marks are recorded by the teachers three times a year in December, April, and June, and are available for the information of the child, his employer and his parents. When a pupil permanently discontinues his schooling either because he attains the age of sixteen years or returns to the conventional school or changes his city of residence, a permanent discharge record is filed for the pupil containing his entire industrial and school record. These discharge cards constitute a separate file catalog and are kept as the permanent Continuation School record of the child. Upon completion of 140 hours of satisfactory schooling in the Continuation School a child is given a certificate attesting to his successful prosecution of the course elected. These certificates which are difficult to obtain are valued highly by the pupils, and frequent inquiries as to the possibility of a pupil's obtaining this certificate are received from the children, their parents and their employers.

Group Activities.

Continuation School pupils should be impressed with the idea of self-responsibility in anticipation of their future places in civil society. Any student of psychology will admit that the adolescent craves that self importance which comes from imposed obligations and duties. We have purposely placed responsibilities on the shoulders of these young workers constantly emphasizing on them their duty to their city, to their neighborhood, to their employer and to their parents. The response which they give and willing co-operation which they lend in this work prove that our confidence is not misplaced. The extreme freedom from disciplinary measures, and intense interest shown by the pupils in their work is frequently remarked upon by casual visitors to the school. These children feel a sense of responsibility for the care and maintenance of their school and the general procedure in regard to school work. The co-activity of right with its corresponding obligations can here be strongly impressed on these pupils. Activities which tend to solidify gang spirit and group action are stimulated and encouraged, feeling as we do that these activities can only reach their fullest fruition when actually participated in by the pupils. We have urged inter-class discussion on the part of the children, having them assume the responsibility for its conduct and making them the real actors in the play. The debating clubs which are held in conjunction with school work and which serve as a wonderful stimulator of class effort and school spirit; the walking clubs, the swimming clubs, the thrift clubs, basket-

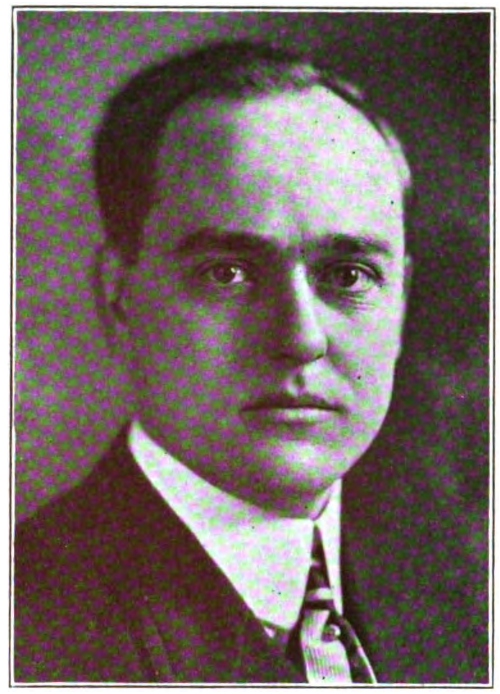
ball games, baseball games, all of these activities which are conducted under the direction of the instructor in charge tend to crystalize more firmly the school spirit of the children and emphasize the advantage of group action. The encouraging feature in all continuation school work is the fact that these children are so co-operative and willing to work together for the betterment of their school. We have a continuation school Bulletin, edited by the children, the continuation school orchestra, the glee club, the athletic association and the numerous other inter-school activities which are conducted entirely by the students. Continuation School pins purchasable at five cents each are worn by each student.

Assembly.

There is an imperative need for an assembly hall in all part-time schools. Assemblies of the entire student body should take place at least ten times a week in order to include the different groups. These meetings should take place during the last ten minutes of the session. Reputable business men, physicians, dentists and playground instructors should be invited to address the students and emphasize the qualities necessary for success in the business world and the need of health as a prime asset in industrial and civil life.

Education Given in a Continuation School.

The education received in a part-time school is of positive advantage to these children, their employers and the community in which they reside. The right ideals of conduct which are inculcated are of inestimable value to the state. The minor of today becomes the adult of tomorrow. Cognizant of this fact, the continuation school is attempting to purify the stream of society at its fountain source. Training given in a part-time school is avocational as well as vocational. The deferred as well as the immediate value of instruction is recognized and given place in the curriculum. Utilitarian and cultural instruction are linked together for greater efficiency and higher service to home, employer and community. If the continuation school can train these children to be solicitous concerning their health, their behavior and their vocational aptitude for employment, then the work of the school has been eminently successful. These should be the criteria by which all part-time work is measured and appraised. The continuation school is an institution typifying the real democracy of education. She has no aristocratic standards for admission. All employed minors are welcome, regardless of previous education, whether economic necessity or dislike for school work has caused the child to sever his connection with the elementary or high school. Some are typical, a few are morons, but the great majority are healthy, normal children compelled to leave school either because of economic necessity, or because the theoretical instruction of the average school does not appeal to their practical minds. Efficient schooling for this group of employed children constitutes the continuation school problem. The part-time school is cognizant of its limitations. It cannot make "a silk purse out of a sow's ear;" neither can it transmute a "blind alley" job into progressive employment. But it can transform its curricula to meet the requirements of the industrial world; guide these children to the intelligent choice of a vocation, warn them against the deadening influence of enervating work, and prevent them from augmenting the derelicts of human society. Her functions are to guide, counsel and instruct; to train the heart as well as the hand and head. She must force the sun of human sympathy through the black shutters which the hand of poverty has drawn across the windows of the tenements. She must train these children for civic and vocational efficiency. The continuation school is not a panacea for all the ills of the working world, but she is training for efficient citizenship, diminishing the ranks of the city's unemployables, preaching the doctrine of human sympathy above the grating roar of factory wheels, and throwing a ray of hope and inspiration into the lives of the working children of the poor.



CARL T. COTTER,
President, Western Arts Association.

At the 1921 meeting of the Western Arts Association, held May 3 to 7, at Peoria, Ill., Mr. Carl T. Cotter, Director of Manual Training at Toledo, O., was elected president of the association.

Mr. Cotter was educated in the schools of Toledo, graduating from the Central High School and from the Scott Manual Training School, one of the first manual training schools in the country. He was graduated from the mechanical engineering department of the University of Michigan, with the degree of B. S. (M. E.) and spent two years in manufacturing plants.

Mr. Cotter began his teaching career in the high school department of the Toledo University and Manual Training School. From there he went to the Hackley Manual Training School at Muskegon, Mich., as instructor in mechanical and architectural drawing, and after two years was made director of the school. He left this position to take charge of the department of manual arts in the Toledo schools in 1909, remaining until the present time.

PROJECTION APPARATUS

William V. Winslow, North Tonawanda, N. Y.

TEACHERS of mechanical drafting are familiar with the theory of orthographic projection. In all probability they have never examined an elementary textbook on this subject without observing illustrations of the "imaginary transparent box" into which an object under consideration might be assumed to be placed for the purpose of obtaining certain views in accepted relationship one to another. The usual relationship of views is that of the third angle. These views are as follows:

(1) A front elevation (front view.)

(2) A side elevation (side view) placed to the right of the front elevation.

(3) A plan (top view) placed above the front elevation.

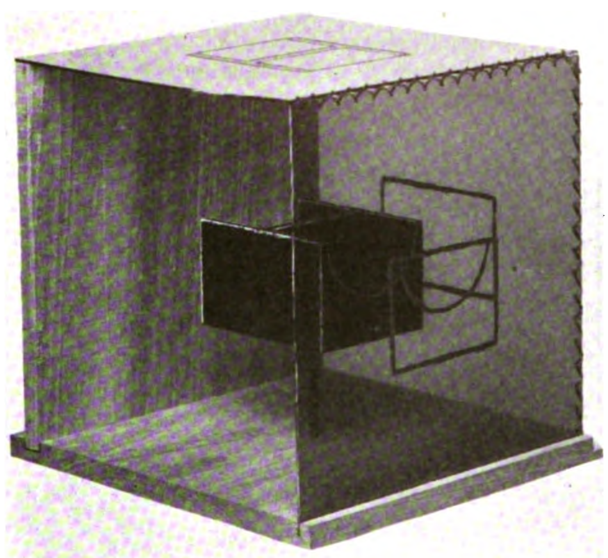


FIG. 1.

In orthographic projection these views are not only arranged as stated above but are coordinated in such a way that the corresponding parts check up. The relationship must be complete. How can the theory best be made clear to the student?

Probably the best way to put across the theory of orthographic projection is to make the imaginary transparent box a physical reality. The accompanying photographs show how this may be accomplished. Three transparent pieces of celluloid are laced together by means of fish line. It will be noted that these pieces are square and that one of them is inserted into a base board. Another board serves to give the box stability. Fig. 1 is a photograph of a projection box taken from the front and left side. It also shows how the back board of the box is inserted into a groove in the base board. Fig. 2 is a photograph taken from the front

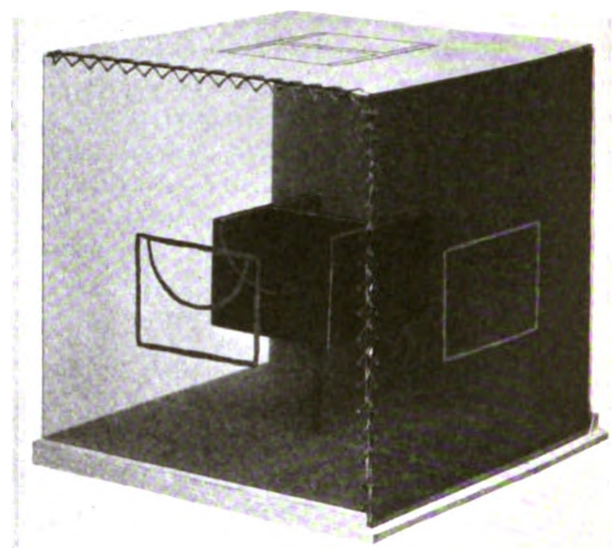


FIG. 2.

and right side of the box. Fig. 3 shows how models are set up. They may be placed on an individual standard with a block for support or they may be inserted directly into the base board of the box. Sometimes, however, it may be more convenient to place an object, a construction, or a machine part in the box with no standard.

Subject Matter for a Lesson Illustrating the Use of the Projection Box.

We have seen blueprints and we know how important these are to industry. It is an advantage to anyone to be able to read them. The theory of working drawing may be easily understood by means of a projection box.

The projection box consists of three transparent planes, two vertical and one horizontal. (Fig. 2.)

The object is placed in the box.

The front view is determined by bringing the points of the object straight out to the front vertical plane.

The top view is obtained by bringing the points of the object straight up to the horizontal plane.

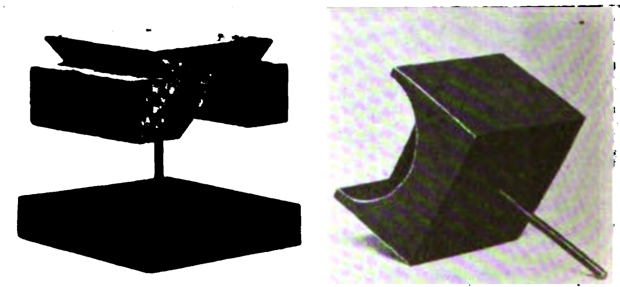


FIG. 3.

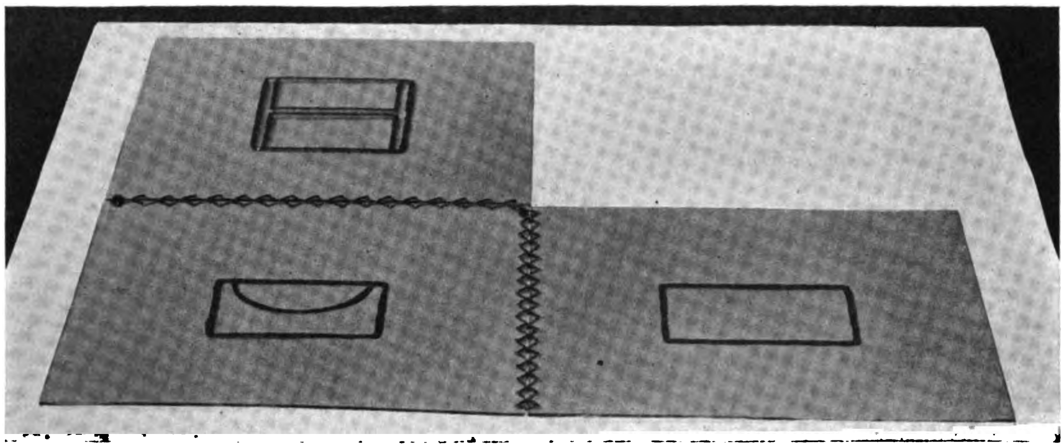


FIG. 5.

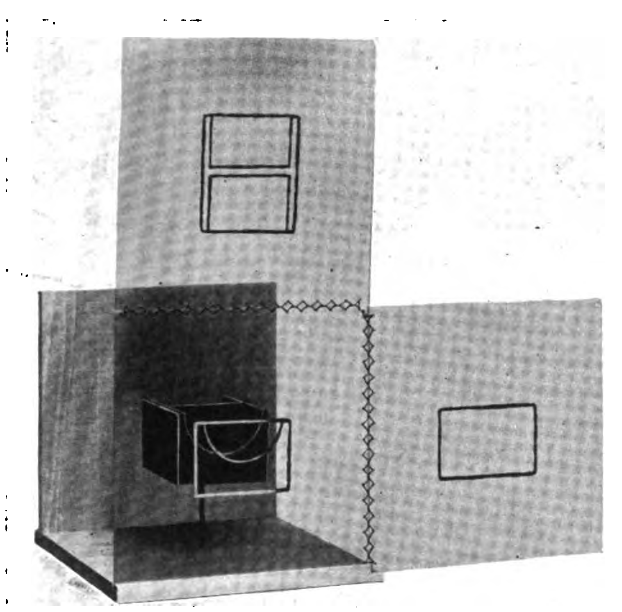


FIG. 4.

The right side view is obtained by bringing the points of the object straight out to the right vertical plane.

The horizontal plane is then revolved upward and the right vertical plane is revolved forward so that all three planes lie in the same plane. (Fig. 4.) This is the way the views are represented in a working drawing. They appear like this. (Fig. 5.)

The projection box should be used in the schools wherever working drawing is taught, that is to say, usually above the fifth grade. It will be found that a ten per cent solution of tincture of myrrh painted on the smooth surfaces of the celluloid will make it possible to draw directly upon the box with a soft blackboard crayon for the purpose of illustrating the views. Rosin dissolved in alcohol will serve the purpose equally well. Of course the solution must be allowed time to dry thoroughly before the crayon is applied.

Hidden lines are not represented in the early lessons. It is probably needless to say that in the grades technical terms should be avoided.

Upon trial it will be found that projection apparatus has an appropriate place in the elementary, in the high, and in the continuation and evening schools. The projection box should not be reserved for technical schools and colleges for it will explain and clarify ideas of working drawing just as surely as it will aid in the presentation of descriptive geometry. Why not use a projection box?

PRIZE POSTERS MADE BY PUPILS IN THE BUFFALO SCHOOLS IN CONNECTION WITH A CAMPAIGN FOR SAFETY IN STREET TRAFFIC.

SIX LESSONS IN COMPOSITION

Frederick Ames Coates, Prevocational Shop Instructor, Sherwin School, Boston, Mass.

EVERY teacher of printing, in no matter what type of school, comes very quickly face to face with a problem which exists in no other manual or industrial subject. The first step in the printing process, the prerequisite to all the others, and the one which remains of greatest importance throughout the course, is composition: the setting of type. Yet it is precisely in this first step that the learner encounters more difficulties, of manipulation, memory, and judgment, than he will be likely to come upon in any three-months' period later in the course.

For to set a single stickful of type, the pupil must know the "lay of the case," the proper method of holding the stick, the direction in which to set the line, the correct placing of the types with regard to nick, justification, paragraphing, and a host of other things, down to the use of ligatures and inverted commas. Furthermore, before he can proceed to the press, or even take a proof of his single stickful of type, he must learn the use of the galley, the difficult art of emptying the stick, and the method of tying the type firmly. A formidable program, indeed, for the beginner who is eager to "print"!

Of these difficulties, the chief one—whether justly or not—is usually considered to be the learning of the case. The multiplicity of letters and other characters, in their apparently orderless array, is apt to appal the learner. Several methods, and variations upon them, have been used in schools—and in shops, for that matter—for teaching the case.

One method consists in giving to the pupil a lettered diagram of the case—or an actual case with the various characters marked on the boxes—and setting him the task of "learning" it; testing his purely memonic achievement later by questioning him on an unlabeled case. This is perhaps the most obvious method; but I think that anyone who has tried it will agree that it is a very unsatisfactory one. It gives to the pupil, at the very threshold of the fascinating field of shopwork, a false idea of similarity between printing and the very dullest of classroom subjects at its worst. It is not properly teaching at all: it is merely the setting of an onerous task, to which the learner is not likely to bring enough enthusiasm to achieve a commensurate result; and it is likely to form in him a distaste for composition which will persist.

Another way of teaching the case which has been very earnestly and seriously advocated, at least in Massachusetts, is to "place a stick in the boy's hand, give him his copy, lead him to the case, and leave him to his own resources." No doubt this will appeal much more to the average boy than the way first mentioned; but, even when preluded by a correct demonstration of typesetting on the part of the instructor, it is essentially a method of learning by making mistakes. The trouble is, the pupil is quite likely to make so many mistakes that he will become discouraged. Furthermore, it is altogether too easy to acquire incorrect habits, and too hard to eradicate them. What teacher of printing has not seen a pupil, even after considerable correct experience, trying to set the type from right to left in his stick? And it may fairly be questioned whether this method does not consume an unreasonable amount of time, even when it is successful; and so delay the complete conception of the printing processes which it should be the desire to give as early as possible.

There is, fortunately, a very wide middle ground, in which the large majority of teachers are probably working. What follows purports to be a description of such a middle course which I have developed into its present shape during several years of teaching printing. I claim for it no particular merit of originality: for some of its features I am definitely indebted to precursors in the field. But to the man who is beginning his first year as a teacher of printing, or who has not yet developed a satisfactory course, whether he comes from the trade or from the ranks of manual-training instructors, this may be of value as a very concrete program which can be relied on for good results, and may obviate that "floundering" which is always at the expense of the pupil.

In presenting the first lesson, the instructor shows each pupil how to hold the stick—and sees to it that he actually does hold it in the prescribed way. The case is then examined, and the disparity in the size of the boxes made a subject of attention. It may be worth while to analyze, previously, a page of any book, with an eye for the relative frequency of occurrence of the various letters; but if this is done, it should be done in the classroom—not in the pregnant atmosphere of the shop! At any rate, it is pointed out that the letter "e," being the most used, requires a larger box to hold the quantity needed. The instructor sets a few letters from the "e" box; then the pupil is directed to set an entire line of e's. In the almost certain event that the case is not perfectly clean, he will lay aside the wrong letters which he picks up; for he is to inspect the faces of the letters on placing them in the line, as well as the nicks. No proof is made of this line, nor of any of the lines in the first lesson. Obviously there is no justifying; no attempt should be made to tighten the line with letters. The lesson is to teach the location of the box; how to hold the stick; how to pick up and place the type. These three things are simultaneous: a fourth follows.

When the line is filled, the pupil is taught how to pick off the last few letters from the line with finger

eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eat eat eat eat eat eat ate ate ate ate ate
the rain in the rain in the rain in the rain
the train ran near here rather than there
windows windows windows windows win
those are not the words that he said then

Lesson 1.

Herbert Chestnut Job No. 5
A printer quickly begins to "mind his p's and q's," because it becomes quite necessary in dealing with type. The b's and d's, too, may puzzle him. Can you tell these letters apart on a printed page? Try it! Are the b's, p's, q's, and d's in your own case all in their proper boxes? If not, prepare for trouble!

JEFFERY TIMBERLAKE JOB NO IV
THE CAPITAL LETTERS FOLLOW THE ORDER OF THE ALPHABET, EXCEPT FOR J AND U, WHICH ARE LEFT OUT OF THEIR NATURAL PLACES, AND PUT IN THE BOTTOM ROW, AFTER THE Z. WORDS IN CAPITALS REQUIRE WIDER SPACING
THIS LINE IS SPACED WITH ONE-EM QUADS.
THIS LINE IS SPACED WITH TWO THICK SPACES.

Donald G. Wheeler Job No. 2
This line is spaced with en quads.
This line is spaced with thick spaces.
This line is spaced with 4-em spaces.
This line is spaced with 5-em spaces.

Maurice Monaghan Job No 6.
There are in the case certain "tied letters" or "ligatures"—combinations of two or three letters cast in one piece. These are fi, fl, ff, ffi, and ffl. In every first-class printing office these must be used: no choice is offered. A full-fledged compositor never afflicts the reader's eye with such a flagrancy as "muffle" for "muffle." Keep a careful watch for these combinations until sufficient practice has firmly fixed the habit.
Another thing to keep in mind is the difference between the Hyphen (-) and the Em-Dash (—). The Hyphen is found in the lower case, and is not a mark of punctuation, but of spelling. It is used in compound words, and also where a word is divided at the end of a line.

Elmer Lovelace Job No. 3
The letters b, c, d, e follow their regular order in the lower case: skipping two boxes, we come to f, g. The sequence l, m, n, o is broken only by h, which comes in between. In reverse order come t, u, and v. The numbers 1 2 3 4 5 6 7 8 9 0 run along the top of the right half of the case and downward. At the extreme left edge are some of the little-used letters: j, z, x, and q.

LESSON JOBS DESCRIBED BY THE AUTHOR.

and thumb of his right hand; how to separate them and drop them one by one back in the box. Under no circumstances should he be allowed to dump them into the case all together. So far as the right hand is concerned, he should carefully follow the correct manner of real distribution, regardless of the fact that all the letters are to be returned to the same box. He can not have too much practice in this; and any lack of it will trouble him later.

When the stick is empty, the pupil sets the second line in like manner. In preparation for it, the instructor shows him where to find the t, the thick space, and the a. Their positions, centrally located at the edge of the case below the already-known e, are easily fixed in mind. Nowhere in the room—in the case itself or on the blackboard—should there be lettered designations of the boxes: if there are, the average pupil will rely exclusively on them. The important thing is that he shall learn the boxes unconsciously, automatically, by using them. If necessary—and in some cases it may be—the learner should set each line several times. When the second line is finished, it should be distributed as before. The practice with the e's proves its value here: with them, it made no difference if two or more letters were carelessly dropped at one time, but now such an accident would result in a pied case.

The remaining lines in the first lesson are proceeded with in the same way. The third introduces the letters h, r, i and n; the last brings in w, d, o and s. In addition it will be noticed that each line reviews the letters learned in those that preceded. Gradually, and with little if any conscious effort of memory, the pupil has learned the three central rows of large boxes, in addition to the smaller w box. The thick space is the only one used thus far; no attempt has been made to tighten the lines, because they are not to be emptied.

But by this time the pupil, having set up actual words, is eager to see them "in print." The second lesson provides for this. Emptying type and taking a proof of it implies lines of equal length; and these in turn presuppose a knowledge of the various spaces. But even in justifying, there are degrees of difficulty. It is much simpler, for instance, to justify a line at one place only, than at a number of places between the words. Every line in Lesson Two is justified at a single place: the first in the center, the others at their right ends. The pupil uses some capitals (thus being introduced to the purpose of the upper case, though he is hardly expected as yet to remember any of the locations), and some figures. The l, p and c are added to his stock of lower-case letters by repetition; he also uses the q, u, k and m, the hyphen, and the period. The last-named, at least, he should remember. But primarily, he has learned the spaces: where they are, what they are for, wherein they differ. The one-place justification is learned under the individual instruction of the teacher; the names and size-relations of the spaces are told in the copy itself, and their relative thickness is very graphically portrayed in the finished job. As the concluding steps of this lesson, the pupil should be taught to empty his type on a galley, tie it, and take a proof. If in his attempts he should pi the type, no harm is done; the practice of distributing the pi, of re-setting and justifying the lines, will be of value; and he will gain an impressive lesson on the need of care in handling type. After he has taken a proof, he is shown how to distribute the type correctly, holding it level in his left hand. The work of the right hand in distribution is already familiar to him.

For the third lesson, a blackboard diagram of the case will be useful; but on it should be labeled only the letters that are new in this lesson. Those previously used should be by this time firmly lodged in the pupil's memory.

This lesson uses all the letters and figures in the lower case, the period, comma, colon and semi-colon. The text of it gives valuable hints as to their location which will help the pupil to remember them. Each boy should save his proof of this job for that purpose. And in this lesson he is introduced for the first time to complete between-the-words justification, for which his one-place justification of the preceding lesson has paved the way. He should be impressed, too, with the necessity for obtaining even spacing, and with the practice of using a larger space, generally an em-quad, at the end of a sentence.

The fourth lesson of the series is in some respects non-essential at this stage of the pupil's experience; but it capitalizes the curiosity which he has already acquired about the upper case, and gives him all the working knowledge that he will need about it for future use. It introduces no new manipulative processes. It sufficiently explains itself. If desired, it can be made the basis of an introduction to double and triple leading. (The preceding lessons would normally have all been single leaded.)

Lesson Five brings in the use of inverted commas, the apostrophe, both singly and in quotations, the exclamation point and the interrogation mark or "query." It also introduces paragraph indentation and the quadding out of a short line at the end of a paragraph. The text of this lesson may well be used, as I have used it, as an occasion for having the pupils clean the b, p, q and d boxes of their cases, which will almost inevitably have become mixed during the distribution entailed in the preceding lessons.

It is desirable that the sixth lesson should be set in fac-simile from reprint copy, to make sure that the pupil encounters the word-divisions, of which there are four. The other use of the hyphen, in compound words, is also exemplified, as is the use of the em-dash in punctuation. The five ligatures or tied letters are brought in here, each being used from two to four times. Except for calling attention to the new matter, the teacher should give no aid or instructions on this lesson, but should let it serve as a test of all that has been previously learned. He can do this in the assurance that the pupil who makes a satisfactory showing in it is now ready to proceed to any ordinary "straight composition" from either reprint or legible, carefully-prepared manuscript copy.

I have made no mention of the use of thin spaces with quotation marks, of wider space after a colon, and so forth. Since the introduction of machine composition, the tendency in most commercial shops is to discard these "fine points" of spacing. They can be brought in, if desired, at the appropriate places.

For further set lessons, no advice is here given. The exigencies of each particular shop: the product expected, the type of pupil, the time and equipment at the instructor's disposal, must shape the course from this point onward.

The merit which is claimed for these lessons is an orderly and gradual presentation of the difficulties which beset the beginner. Variations, if for any reason they are desired, will readily suggest themselves; but a word of caution in that regard may not be out of place. The prime consideration is the simplifying and minimizing of difficulties. An attempt to make the lessons more comprehensive than they now are is likely to result in vitiating the purpose for which they were prepared.

WEST INTERMEDIATE SCHOOL, JACKSON, MICH.

Household Arts in the West Intermediate School, Jackson, Mich.

Margaret Chambers, Cafeteria Director

WE often hear it said by experienced housekeepers that they never studied household arts, but could keep house and cook as well as anyone. This is likely true, but they do not take into consideration the general condition of the times. When these housekeepers were reared their mothers had only one interest—their home. Now mothers have many outside interests, such as clubs and voting, and many of the mothers work. It was the old-fashioned mother's pride and joy to bring up her daughter to be a good housekeeper. Today girls are taught more to think about preparing themselves to make their own living in office, store or schoolroom.

My experience in teaching evening school—dealing with girls above the school age—has proved to me that girls get very little teaching. Girls about to be married know very little about the making of a home. There are many things along this line that the public schools are not reaching. Household arts, if properly managed, can reach every activity in the every day life of the home.

Close observation leads me to believe that there are great possibilities in the further development of Household Arts. The directors of this work in the West Intermediate School of Jackson, Michigan, of whom I am one, have had many opportunities to develop new ideas, but as yet there are many undeveloped.

This school itself is perhaps the best equipped intermediate school in the country, and is especially well equipped in the household arts department.

The plan of cooking and sewing in the seventh and eighth grades is much the same as in other Intermediate schools. Cooking is required in the seventh-"B" and this is the only household art work that is required. Sewing is offered in the seventh-"B"; cooking and sewing in the seventh-"A"; cooking, sewing and serving in the eighth-"A" and eighth-"B."

In the ninth grade dress-making and cafeteria management and household management. This article deals only with cafeteria management and household management.

The cafeteria management has been under my supervision since the beginning, two years ago, and we have worked out many ideas that have proved very successful.

The cafeteria is a large, airy room, equipped with a very attractive steam table with a white marble top. The dishes are placed behind the table within easy reach and the ice-box is accessible also. The cafeteria kitchen is equipped with an electric dishwasher, potato parer,

potato masher, fan for removing heat and odors and other labor-saving machines. Superintendents that have visited our school have asked if we did not believe in teaching girls to pare potatoes. To this we reply that we certainly do, but that we do not think it necessary for a girl to pare three or four bushels a day to learn how.

The plan of work at the present time is to have each day three groups of about sixteen girls each. The first group comes at 9:45 o'clock; the next at 10:55, and one after lunch. The lunch is started by the first group and finished by the second. The group after lunch cooks food for the next day, and puts the kitchen in order. All groups are expected to wash all dishes and utensils used by them, and leave the kitchen in perfect order. The girls have charge of the kitchen at all times. They plan menus with regard to food value, learn how to use the left-overs and prepare all food used in the lunch. The only foods used that are not prepared in the kitchen are ice cream and white bread.

Each day one girl does the buying, learning in this way the cost of food and how to select it. The money taken in each day is counted and prepared for the bank, and one of the girls takes it to the bank and deposits it. Some of the girls have never been inside of a bank and do not like the idea of going, but after they have been there once and learned how to deposit money, they would like to go every day. The bank is interested in this plan and does everything to help the girls. When bills come in, the girls go over them and make out checks in payment.

A housekeeper is appointed in each group every day. She takes charge of the class, keeps an account of all materials used and price of each; sees that the kitchen and cafeteria are in order and that the girls do their work and are neat in appearance. Girls are marked on appearance and results.

The domestic science department furnishes one dish to the cafeteria once or twice a week, and the cafeteria either furnishes the material or pays for it.

There is no special serving group, all regular groups take turns in serving. This part of the work teaches courtesy, power to meet trying situations with ease, handling of money and many other things. All this is important and should be learned by all the girls. All the work of the cafeteria is so arranged that every girl gets a share in every activity.

This course is elective and the girls receive school credit the same as in any other course.

We feel that the advantage of this plan is that it gives the girls good training along many lines, and although the cafeteria is self-supporting there is no desire to make money, just so the children get a better lunch for less money.

The household management course has been tried in several different ways, but as yet we are not satisfied with it. The way I would like to see it tried is as follows:

In the West Intermediate school is an apartment, consisting of living room, dining room, bed room and bath. These are furnished with "Period" furniture and beautiful rugs. The apartment is very well suited to the course, except that a kitchen should have been added. All cooking is done in the domestic science kitchen.

The aim of this course should be to prepare girls for the future wives and mothers of our country, as ninety per cent of all the girls leaving school become home makers.

I would have the furniture removed from the apartment and have the girls come into an unfurnished house. The first thing taught should be how to furnish a home on a certain salary or amount of savings—some girls taking the average salary, some a little below, and some above. The same with the savings.

The only way to teach girls about furniture would be to take the girls to the furniture stores and let men that have spent their lives with furniture tell them something about it, with the furniture to look at. The cooperation of the furniture men would be necessary. but all whom I have talked with thought the plan fine. Girls should have tests on these visits to see what they get. They should also do some reading under the direction of the teachers. The girls should then select the furniture for the apartment and one of the local firms should be asked to lend it as an advertisement, and the girls should proceed to place it in the apartment. When the girls had time to arrange the furniture, several different ways, and had studied the effects, it could be returned and the furniture belonging to the apartment put back.

The expenses of the home should be considered—cost of food, light, gas, rent or payments on a house, insurance and fuel. In fact the budget of a house to meet the salary. Girls using the salaries considered in the first of the course. I think at this time it would be well to invite an insurance man to come and tell them how to insure furniture and clothes.

During this time the girls should be taught sweeping, dusting, bed-making, table setting, cooking and serving meals, care of bath room, table and bed linen, and everything that goes with housekeeping.

The next part of the course should be laundry work, washing and ironing—plain and fancy, white and colored clothes, table and bed linens—removal of stains, darning linen, dry cleaning and pressing.

Last but not least, I would give a course in the care of babies and sick room. The cooperation of the school nurse would be necessary. She would give some talks to the girls, telling them the things that it is necessary for them to know, teaching them how to wash and dress a real baby. Each group should make a complete layette within the reach of a certain salary. These layettes could be sold or given to some poor person. Infant diet is another important factor, and great care should be given to it. Care of the sick room in different

diseases, making beds for sick people, diet, preparing trays and a few things about the most common diseases that would help to care for them.

In fact the things that could be taught in the courses are too numerous to mention.

Every girl that goes through the intermediate school should be required to take it. If this course was properly taught with the cooperation of the local firms and the general public, we would see less of the divorce evil and more happy homes and strong, healthy, normal children.

Making Architectural Detail in Plaster of Paris

A Preparation for the Study of Modern Architecture. L. A. Herr, Lincoln School, N. Y. City

THE work described here is the result of an effort to find a phase of industrial-arts work that would be closely related to the history studied by a sixth grade class, and that would also help in the appreciation and understanding of some phase of the pupil's environment. School work is often dry and meaningless because it is too remote from the experience of pupils. Younger children particularly, are interested in the things they see about them. If these things are worth while, nothing will do more to arouse interest and to stimulate personal effort than finding out about them.

The history work to be covered by the sixth grade was the Greek, Roman, and Medieval periods. From the standpoint of industrial arts the question as to how man has provided himself with houses seemed a fitting one to accompany this study. The architecture of modern times, particularly that of the larger cities has received from these periods almost unbelievable contributions, many of which are unrecognized and unappreciated by few except architects and students of art.

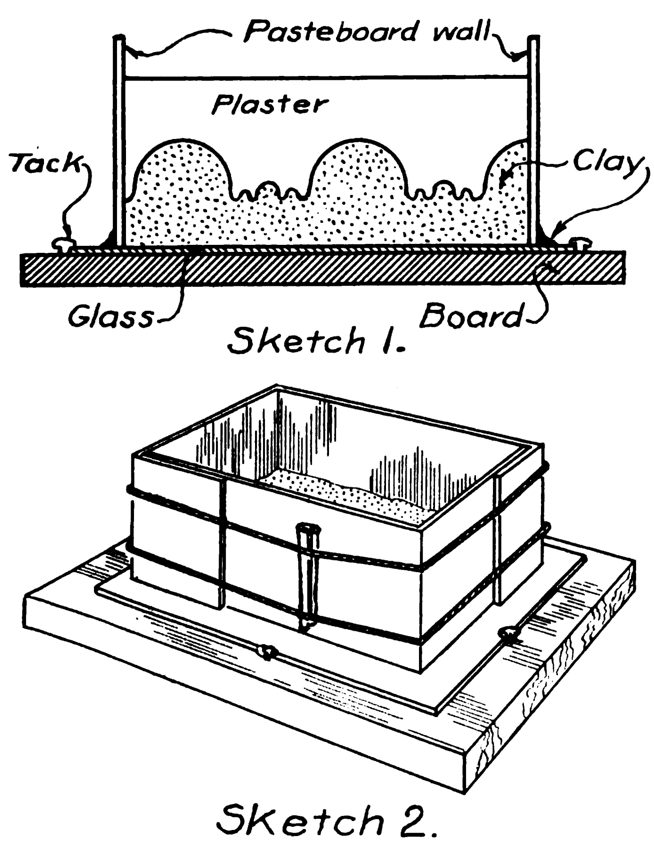


FIG. 1.

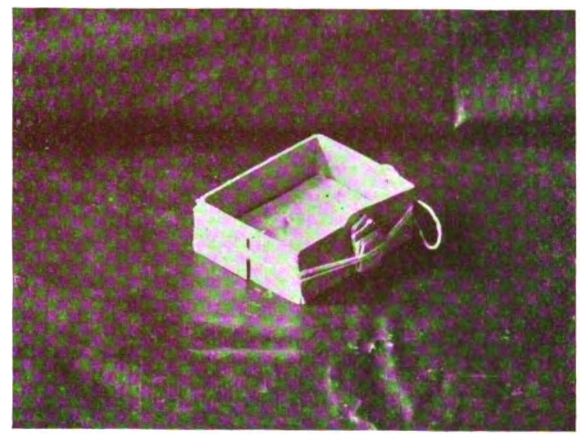


FIG. 2.

Scarcely a public or private building can be found that does not have structural or ornamental features traceable to the work of the Greek, Roman, and Gothic builders. The class showed great interest in such features and other values of even greater worth grew out of the study.

Work began by making a summary of the kinds of houses used from the very beginning of history, noting the relation of these to the kinds of people, their occupations and environment. Following this, a more detailed study of Greek buildings was taken up. The Parthenon received especial attention. All of the pupils had seen the model of this building in the Metropolitan Museum of Art, New York, but after a discussion of the three orders of architecture and the characteristic details of each, another visit to the museum was made.

In preparation for the trip the class was asked to observe and report certain facts. For example, to count the number of channels on the shafts of Doric and Corinthian columns. The fact that the number was found different for each type, and that no matter from what source the example was taken, the number remained true to the type, proved a feature of great interest. Much enthusiasm was shown in pointing out examples of such detail as previous discussion had made somewhat familiar to the pupils and for which they knew the name.

When it was suggested to the class that they might make some ornaments resembling somewhat the examples seen in the museum, they were eager to begin. The children were told that three principal operations are necessary in making a cast, viz. (1) The model-

FIG. 3.

ing of the desired form in clay. (2) The making of a plaster mould from the clay model, and (3) The making of the cast from the mould. From a collection of pictures secured from the library, and from books, each pupil decided upon a type of historic ornament he wished to make. A full sized plan was then drawn on paper. With this as a basis the modeling in clay began. The aim was to make the ornament as true to the historic type as possible. Examples found in buildings, drawings, and photographs were constantly referred to during the modeling lessons. Running borders such as the egg and dart, bead and button, guilloche were favorites with a majority of the pupils; some, however, chose the antefix and the anthemion, and one boy insisted on doing a complete Corinthian capital.

Each pupil modeled and kept his work on a small board measuring about six by ten by seven-eighths inches. While fingers were the principal modeling tools used, the pupils were free to make use of any mechanical devices suggested to them by the character of their own work. Pencils, rulers, compasses, coins and other articles were at times found useful in obtaining some desired shape. This part of the work required several lessons. As there was no provision in the room for keeping clay moist, a zinc blue-printing pan belonging to the drawing department was used. A small amount of water in the bottom of this, together with a covering of boards and cloth made it a receptacle in which the clay was kept in suitable working condition.

When the modeling was completed the second step —the making of the plaster mould from the clay models —was begun. Pasteboard walls were placed around the clay forms to retain the liquid plaster while setting. (Fig. 1). In some cases a thin vertical slice of clay was cut from each edge of the model to secure more perfect vertical edges and square corners against which the walls were to be fitted. The walls were made of strips of cardboard cut wide enough to extend about two inches above the highest points in the modeling. These strips were then bent so as to form close fitting sides around the clay. Two strips each extending a little more than half way around the clay model, providing for double thicknesses at the corners, were found to be more easily managed by the children than one long piece. A piece of string was used to tie these walls around the clay. Small wedges made of rolls of paper or bits of wood were sometimes placed between the strings and the outside of the cardboard to keep the walls pressed close against the clay. (Fig. 2).

The pupils mixed and poured their own plaster, preparing enough for four or five moulds at one time. By this means little plaster was lost by setting before it had been poured. After about twenty minutes the plaster was hard enough so that the walls could be removed and the clay pulled from the bottom, leaving the completed mould of plaster. The fact that the mould is in form the reverse of the clay model was a cause of surprise to many of the pupils. (Fig. 3).

In the succeeding lessons the third main step, that of making the casts from the moulds, was taken up. The processes were almost identical with those employed in making the moulds. Walls of cardboard were now built around the plaster moulds. In some instances the strips of cardboard that had been previously used around the clay were found satisfactory for this purpose. Before pouring the plaster the pupils were shown how to make and insert hangers of cord or wire so that their ends would be imbedded in the setting plaster. The

FIG. 4.

danger of the wet plaster sticking to the mould and to the pasteboard walls, was avoided by brushing these surfaces with a mixture of soap and water before pouring. Moulds that were very dry were immersed in clean water until saturated before being used. The removing of the plaster casts from the moulds completed the work for some of the pupils. Others wished to apply some kind of surface finish to their pieces. For this purpose linseed oil, paraffin, white shellac, and paints were used according to the particular finish and surface desired. Figs. 4 and 5.

Several pupils brought from their homes various articles which they duplicated in plaster. One group whose work was among the first to be finished, prepared slip and showed how dishes might be made by the casting method; for this purpose one-, two-, and three-piece moulds were used. All the members of the class had had some experience in building pottery by hand and many understood the use of the potter's wheel. Thus a foundation was laid for the understanding of processes, later observed in a visit to a porcelain works. This visit coming shortly after the work with the plaster had been completed proved to be a most valuable one, because the pupils had had actual manipulative experiences with both plaster and clay, and were therefore, well prepared to understand the processes and mechanical devices they saw in use.

A part of several class periods was given to the hearing of reports by pupils. These reports were usually prepared by consulting books in the library and at home. Instead of a formal assignment by the teacher the class was asked to suggest points in relation to plaster that they wished to know more about. After this was done two or three volunteers were assigned to report on each topic. Such questions as the following were discussed: What is plaster? What countries produce it? How is it obtained? How is it prepared for use? What are the principal uses of it?

Aside from the regular classroom work there were many interesting voluntary responses. It was a common occurrence for pupils of this class to say, "I have seen this or that kind of ornament or structural feature," making reference to buildings along the street or to their homes. One boy speaking to a guest in his own home said, "I have looked all over this house to see if I could find any egg and dart moulding." A girl reported that she had seen so many examples of a Greek border, that she thought she would make a list of the places where it was found, for "there must be miles of it." A boy, after the close of school, wrote, "I have found Tudor roses, some crockets and finials in the billiard room." He then drew another detail for which he did not have a name and added, "and an ornament that looks like this." The kind of intimate knowledge and interest in architecture revealed in these remarks would have been lost without the approach through concrete experience. The history content which stimulated this work gained, in turn, new significance as the contribution of these early periods to architecture became revealed in modern life.

The work described was completed within a period of three weeks, there being given to it approximately two one-hour periods each week. In addition to the results indicated above, the ground was prepared in a stimulating way for a later and more intensive study of architecture. The work covered in that study, and the procedure by which it was carried out, will be described in a succeeding article.

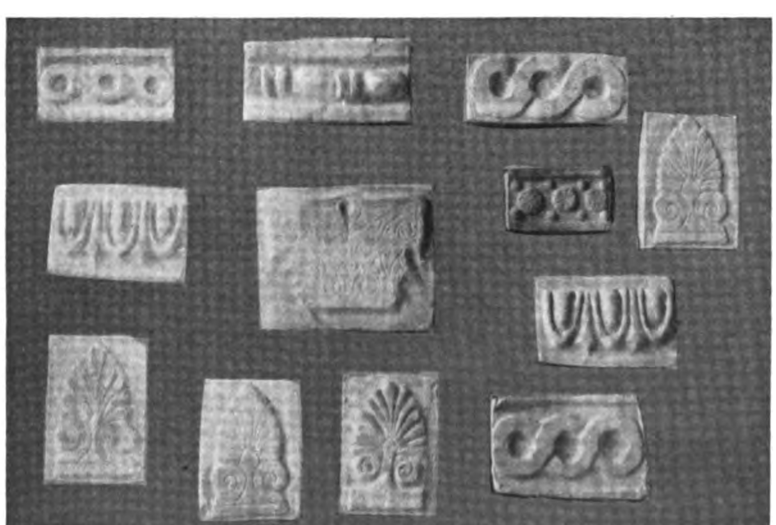


FIG. 5.

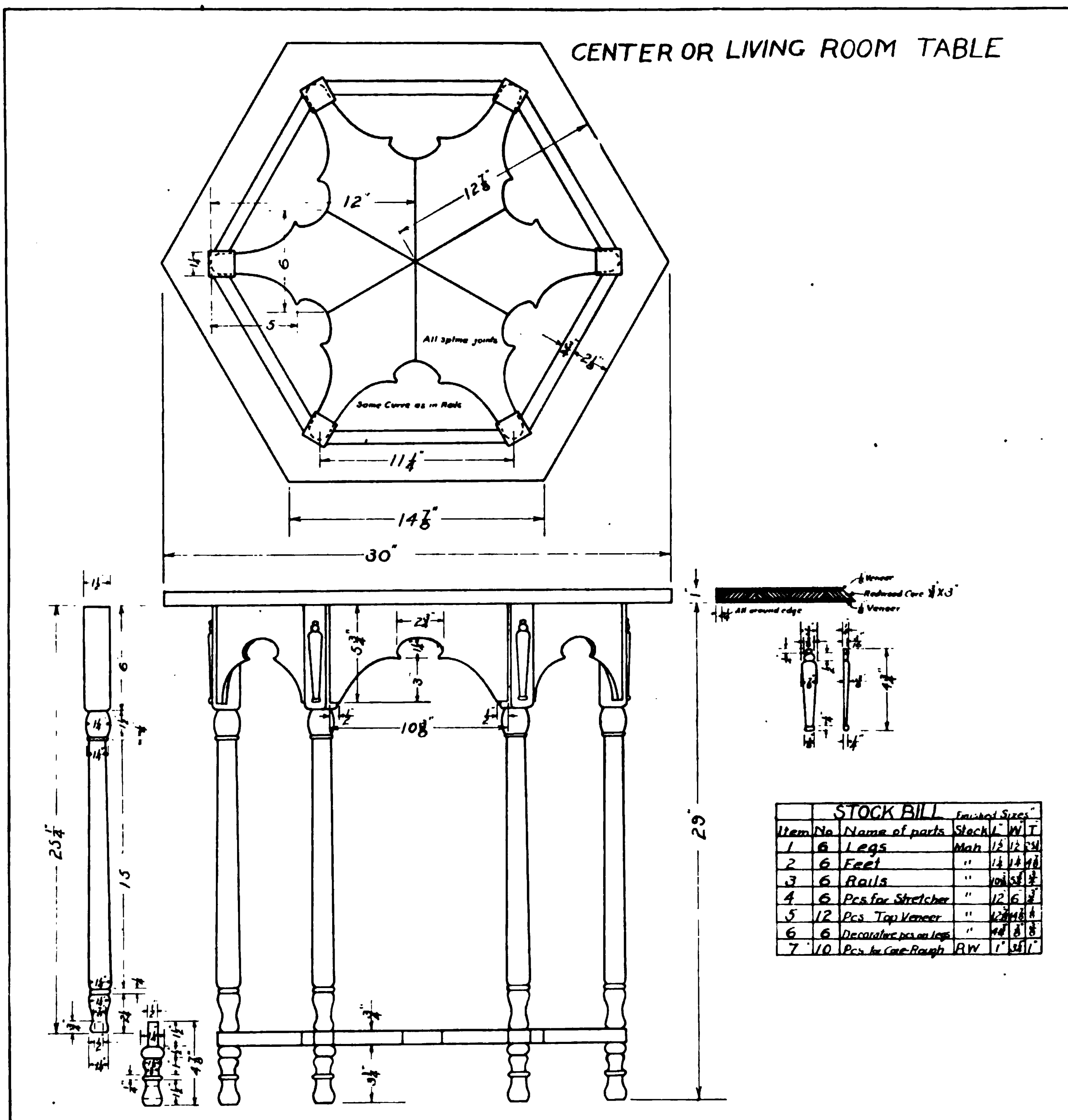
APPLIED TURNING

F. R. Love, Director of Manual Arts, Stockton, Calif.

TURNING to the beginner is very fascinating. At first he is so much absorbed in mastering tool operations that he hasn't time to think about the utility of the thing that he is making. Just as soon as the lathe and tool operations begin to come automatically we find him getting more interested in what he is producing. After he has reached this stage, to keep on giving him exercises that are not applied to something useful starts at once a manifested lack of interest in the work. Whenever he can see that what he is making is to be used, you will never have to find an excuse for having any project in the course.

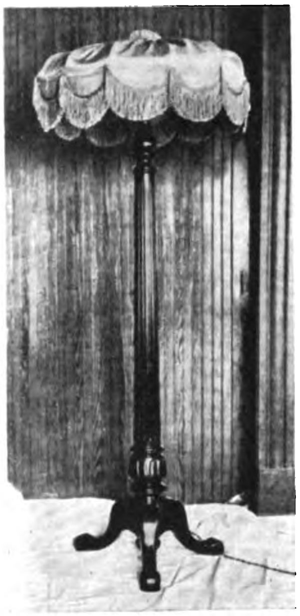
The trouble with most all turning courses is that too much time is put in on unproductive work. To overcome these objections in turning we have made our first year bench work and lathe work one course.

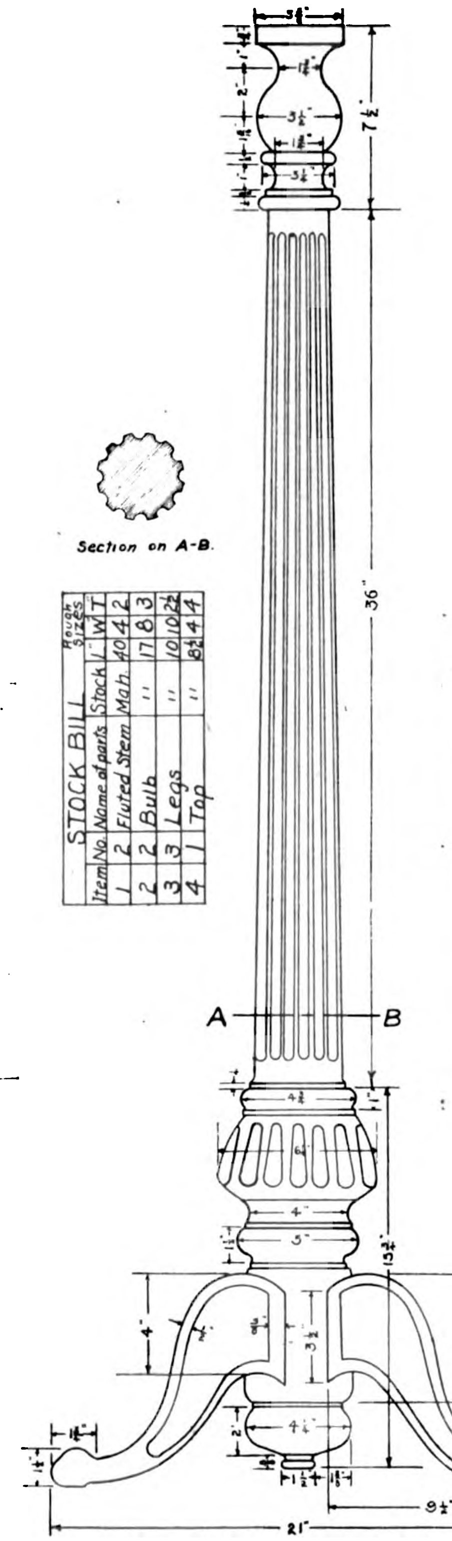
We begin our work on the lathe doing ordinary spindle exercises and apply these exercises immediately. Just as soon as possible we get to doing face plate



STOCK BILL				Finished Sizes"		
Item	No	Name of parts	Stock	L"	W"	T"
1	6	Legs	Mah	[illegible]	[illegible]	[illegible]
2	6	Feet	"	[illegible]	[illegible]	[illegible]
3	6	Rails	"	[illegible]	[illegible]	[illegible]
4	6	Pcs for Stretcher	"	12	6	[illegible]
5	12	Pcs Top Veneer	"	[illegible]	[illegible]	[illegible]
6	6	Decorative pcs on legs	"	[illegible]	[illegible]	[illegible]
7	10	Pcs for Core-Rough	RW	1"	[illegible]	1"

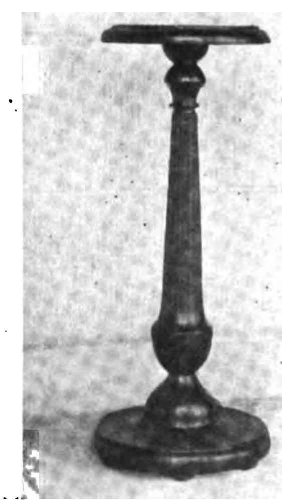
DETAILS OF CENTER TABLE. DESIGN AND DRAWING BY STUDENT.





STOCK BILL

Item	No.	Name of parts	Stock	Rough sizes L"	W"	T"
1	2	Fluted Stem	Mah.	40	4	2
2	2	Bulb	"	17	8	3
3	3	Legs	"	10	10	2½
4	1	Top	"	8½	4	4

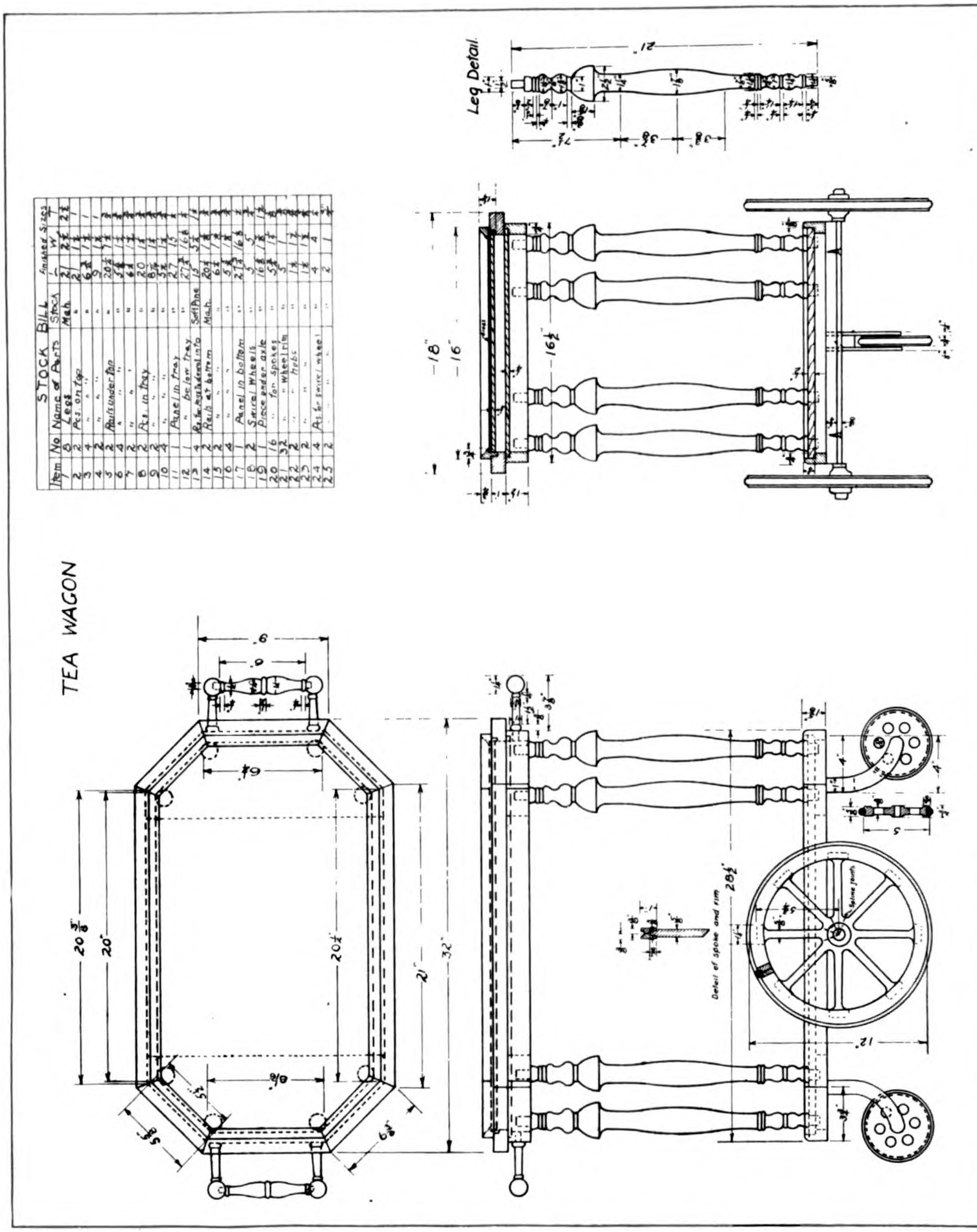


SOME OF THE FURNITURE PRODUCED IN THE AUTHOR'S CLASSES.

work. After a few exercises in both we give a project involving the two kinds of work. After this is finished the boy is given work in reproducing parts such as candlesticks, taborets, pedestals and stools. He starts on this simple work and works up into the more difficult pieces such as piano benches, chairs, tables, chevals, and tea wagons.

It is very interesting to see the number of turned designs that can be made for the furnishing of most any room. We have collected a number of good examples from commercial catalogs for illustrating to the boys the way turning can be applied to the furniture of these rooms.

For illustrating my point let us take a few examples: We will take the morris chair first. Whenever this chair is mentioned we generally think of heavy construction, mission design and very seldom think of having turned parts in it. The chair shown in this cut was made by a second year student and worked up without referring to a cut of any kind. In other words, it



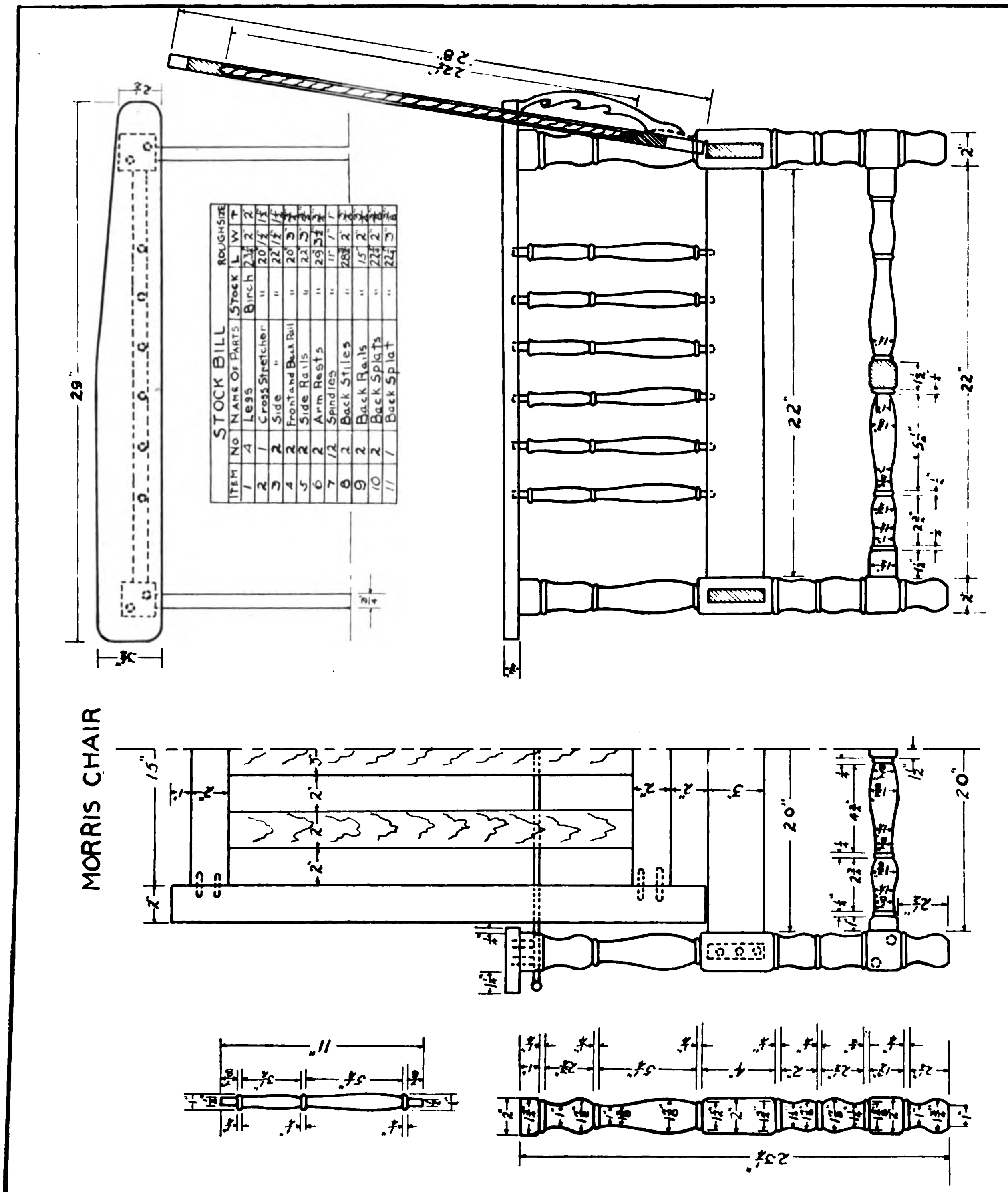
is as near original design as he could make it. The entire turning was done and the chair set up in three months.

The tea-wagon was made by a first-year student, the boy doing exceptionally good work for a beginner. The entire cart was made by him, including wheels and swivels.

The desk and chair was made by a Japanese boy in his second year of work. Both pieces were completed in one semester.

Table and floor lamps are always in demand. The lamp shown was made by a first-year student. The fluting on the lamps and pedestals were made by a special machine that we have to use in the lathe. The entire time for fluting never exceeds one hour.

I have tried to show in these different cuts the application of turning to a great variety of pieces. To begin with, we had to use all commercial cuts, but now we have both ours and the commercial to refer a boy to when he is designing a piece of any kind.



STOCK BILL

ITEM	NO	NAME OF PARTS	STOCK	ROUGH SIZE L	W	T
1	4	Legs	Birch	23½"	2"	2"
2	1	Cross Stretcher	"	20"	1½"	1½"
3	2	Side "	"	22"	1½"	1½"
4	2	Front and Back Rail	"	20"	3"	[illegible]
5	2	Side Rails	"	22"	3"	[illegible]
6	2	Arm Rests	"	29"	3½"	[illegible]
7	12	Spindles	"	11"	1"	1"
8	2	Back Stiles	"	28½"	2"	[illegible]
9	2	Back Rails	"	15"	2"	[illegible]
10	2	Back Splats	"	22¼"	2"	[illegible]
11	1	Back Splat	"	22¼"	3"	[illegible]

I do not believe that we have found one boy in the four years that we have been doing this work that has tired of either his bench work or turning. The variety in the work is great enough to keep him interested all the time.

Another advantage in having these courses correlated is that in the second year the boy may take either cabinet making or pattern making.

We are very much pleased with the results that we have gotten from this work and feel that if you are interested it will at least pay you to try it. You know in California that we are always ready to try anything at least once.

We teach a great deal of this work thru observation and assignments. A boy is given (for example) living room furniture. He is to observe the windows down town and if possible visit furniture stores and then report back to the class. It is surprising the amount of interest a class will show in this kind of work and the ideas they will pick up in design and period furniture. We make an effort at all times to acquaint the boy with the modern adaptations of period pieces.

We do not insist on a boy making a piece of furniture that requires turning. He is allowed to do all bench work the second semester if he desires. At least ninety per cent of our classes have chosen the turned pieces.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

THE SUMMER SCHOOLS WILL HELP SOLVE THE PROBLEM.

If the summer schools that offer industrial and vocational courses are not filled this summer, we have erred in our judgment of the thought and attitude of the special teachers. The new part-time school and the various other provisions of the Smith-Hughes law have laid great demands upon all who come into any sort of relations to this new legislation.

If we are not mistaken, there will be an unprecedented number of teachers and administrators in the summer schools seeking light on the various questions of school procedure which the new legislation has raised. In addition to these, there will undoubtedly be numerous teachers seeking assistance from those of experience in the problems of subject matter, part-time pupil personnel, class organization, methods of instruction, and other questions peculiar to the part-time school.

It is in these new fields of school work that both teachers and administrators are finding their most distressing problems. This summer of all summers is the time to gather together and to discuss, under competent direction, the experiences of the past year under the permissive mandatory provision, to point out the errors made, and to formulate plans, courses, and methods of procedure for the coming year. A very large degree of the success of next year's work in the vocational field depends upon the attendance of school teachers and administrators in the various summer schools.

THE LOST SHEEP.

From the various centers of vocational and Industrial teachers' training comes the general impression that the work is gaining favor among the teachers and school officials. This is a proposition which in no wise antagonizes the public school work as now organized, but seeks to bring those who have left school back to school work under instruction that is adapted to their interests. The various school subjects have definite application to vocational and industrial training. This must be conceded by those who are most concerned with the academic subjects for general educational purpose.

Language, mathematics, sociology, history, geography, etc., are essential to vocational and industrial training. The problem from the teacher's standpoint is to find the best application and presentation of these subjects to that great number of pupils who are not reached through these subjects when taught as part of a regular school course. Those who present this application do not presume to criticize the methods of instruction which have been or are now in use, but seek the best method of adapting these subjects to the specific interest and purpose of vocational and industrial training.

The mature teacher of one or more of these academic subjects is at once most apt to be antagonistic, and, at the same time, is in a position to be most helpful to such an effort. Supervisors have found greatest difficulty in soliciting the help and interest of teachers and officials of the organized schools. Now this missionary work seems to be progressing, and we may look forward with hope for that unfortunate and frequently illogical boy or girl who has fallen by the wayside. Let us not be so intent on the ninety and nine, that the lost sheep be neglected if there is any possibility of room in the crowded fold.

SOLILOQUY.

How did the past school year go with you? A place for everything, and everything in its place? Balance? Harmony? Uniformity? Regularity? Systematic, orderly procedure? Each day's routine carried off without a hitch or jar? Each week and month and the whole year so carefully planned and so precisely conducted that your plans needed no readjustment to the clock and calendar?

That would have been a wonderful year—if it had been possible; but it was not, and perhaps never will be. No! The work was noticeably behind at the end of the first month, a little less behind as the year advanced, and the spring weather and diversions ended with a considerable deficit. Next year we shall get a running start and do better.

This problem of education, like all other problems this side of the millennium, seems to undergo constant changes and needs constant adjustment. It is not uncommon to hear Mr. Old Timer refer to a time when things were very, very much more orderly. We are almost convinced as we listen to him that the millennium has passed and we are living in an age of turmoil and strife that can only lead to destruction. Then we learn that there are strong forces at work to systematize all the forces of nature and all the efforts of humanity. Some wise man seeks to pass a law dividing the year into thirteen months, because 52 weeks is divisible into thirteen months of equal size. Otherwise law makers will make us behave ourselves by removing all our temptations to do wrong. The whole world is to be so regulated by law that time, measure, money, and language will be uniform. Yes, surely the millennium is ahead and not behind us!

And then we wonder if that school year in which we are able to do all of the things planned without a hitch, is to be desired after all. What is to be the result of absolute uniformity, equality, and order? We are inclined to believe it will be absolute monotony. At least we are convinced that a world without new conditions and new problems to test our ingenuity and pa-

tience would be no place for a live, ambitious soul to live in. Let us be thankful for our many diversities, and the adversities which they bring. Let us be thankful for the ambition, energy and opportunity to contend with them.

SUMMER VACATION?

Reports come from the leading summer schools that many queries as to courses and conditions give promise of increased attendance over past years. This is indication of a revived interest in the teaching profession, which is imperative if our schools are to improve and progress. Summer school circulars come to us from New York to California, and the illustrations they present of beaches, playgrounds, and camps are quite as enticing as the summer resort circulars that announce opportunity for pleasure alone. Then, too, the cost of attending a summer school session for two months is no greater than the cost of attending a summer resort for one month.

Combined work and play is generally accepted as a great improvement over either taken separately. Added to the alluring opportunity for pleasure is the opportunity for improvement in professional ability and standing. The teaching profession is unique in this great opportunity to improve in health, vigor, and professional skill at the same time. Why should the summer schools not multiply and grow? Why should the teachers not increase and improve under such conditions?

There is but one reason—the underpaid teacher. Every school official should have in mind the necessity of every teacher spending several weeks of the summer vacation in a summer school. No school official should have in mind the employment of teachers for nine or ten months of service on nine or ten months of wages, with the prospect of the teachers rounding out a living income by earning what they can during the summer at some other occupation.

NEW METHODS OF WASTING TIME.

An instance is related where a well known schoolman took an hour and a half at a teachers' conference in describing in great detail some plan or scheme which he had been working on. He concluded finally with the statement that "it had all been a failure anyhow."

This is an example of some prolific sources of waste which are continually coming to light. It is all very well to carry on experimental work and to keep constantly striving for new and better plans and methods, but we are convinced that the most pressing thing needed now is to perfect plans and methods already in use and to increase the quality and effectiveness of the teaching.

The above instance is so nearly typical of the programs of teachers' meetings and associations that we are disposed to hold it up as a horrible example of what not to do. We know of no other one place where so much time is wasted as the teachers' association meetings. A good deal of the so-called "research" that is carried on and inflicted on over-patient audiences is the merest bunk. Some of it is no more significant than the counting of the nails in a keg. The only possible justification which one can give for consuming a large amount of time in a program is that he has a real contribution to make in the solution of a common and important problem. If he has disproved some commonly held notion, then his contribution is similar in value to the contribution of new facts, methods, and conclusions.

We must have experiment and research, but these are for the comparatively few. The big task is the doing of the daily job of teaching. And we still have a long way to travel before we can say that, generally speaking, our schools are taught in a highly skillful and expert manner.

WHY BOTHER ABOUT ART?

"Because a knowledge of Art can give you more pleasure than almost anything else. It can make you rich. It can give you a vista—and a vision. It reveals hidden beauty. It is like the window in the workshop that lets in the sunshine and gives a beautiful outlook—it makes life more worth while. It makes common things more valuable. A flower pot is worth a few cents, a bowl of the same clay a few dollars—a vase exquisitely formed and finely glazed or decorated sometimes hundreds of dollars. The difference between a kitchen chair and a Chippendale chair is a matter not of materials but Art. The cities of Europe are visited because they are beautiful—works of civic art. The artistic home is the one every one would choose. The difference is a matter of choice—taste. If you want to know how you must know about art. Art is one of the few things in the world that is permanent—the art of Greece is still the glory of that great nation. So is the art of Italy, of France. And France, which is known as the most artistic of nations, has lately proved herself most valiant, most courageous, most enduring. Art is a factor in the civilization for which the great war was fought and for which many gave their lives. It is for all. It enriches life, both for the individual and for the nation."—*American Federation of Arts.*

CHANGES IN ADDRESS.

Readers who will change their addresses temporarily for the vacation months or permanently for the coming school year are earnestly requested to notify the Circulation Department of the INDUSTRIAL-ARTS MAGAZINE.

The exact forms of both the old and new addresses invariably should be stated so that prompt and accurate mailing service may be continued. It should be remembered that complaints for non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

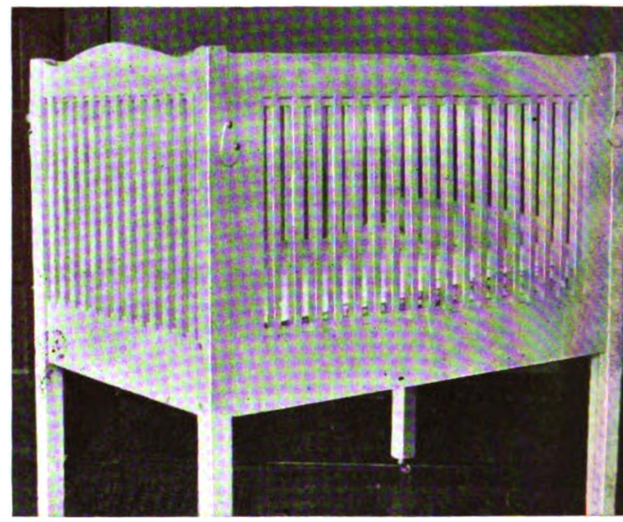
Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

CHILD'S BED.

Howard R. Porter, Ellensburg, Wash.

The construction of this project is probably well enough explained by the drawing, but a brief description may aid. The material throughout is white pine. M. and T. Joints can be used throughout, though the bed shown in the photograph has the side rails held in place by means of screws put through the mortises and tendons from the inside faces of the posts, allowing the piece to be taken down for shipping. In placing the slats in the sides and ends, a groove was cut in the rails and the stub tendons of the slats evenly spaced with small blocks, glued in place. The tendons on the slats are most easily made by taking boards of good width, cutting to correct length and sawing one large tendon, after which the board is ripped into ¾" strips.

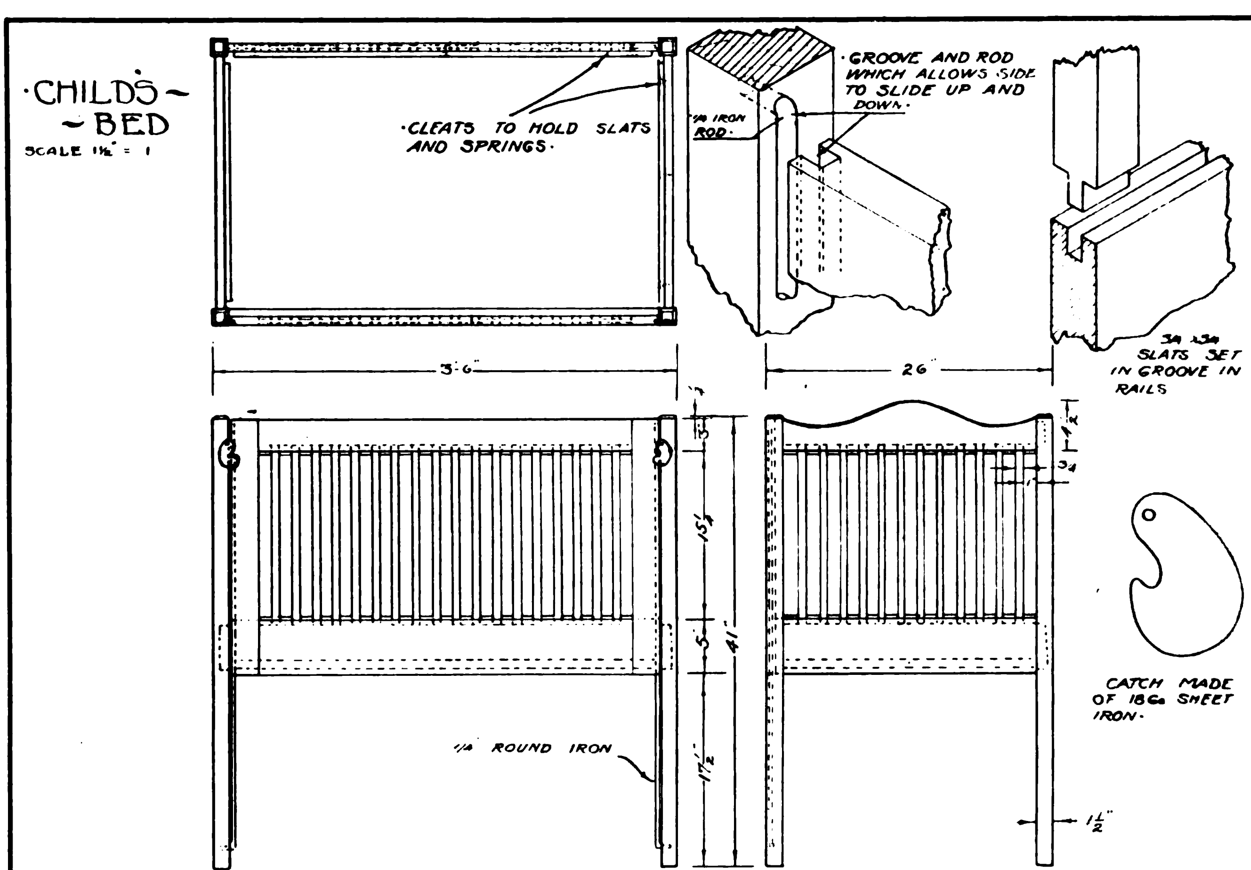
The front side of the bed which slides down to permit of easier access to the inside, is made as an independent frame. It has grooves cut in the ends which allow it to slide easily up or down on the ¼ inch round iron rod which serves as a track. This makes a much quieter arrangement than the one used on the manufactured article where metal slides on metal, and hooks rattle.



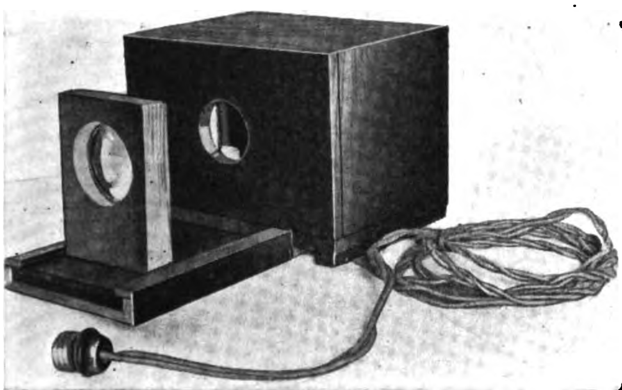
THE COMPLETED BED.

Two round head screws near the edge are caught by two sheet metal catches when the side is raised to its ordinary position. These catches, as shown in the drawing are shaped so that a slight upward lift on the side throws them outward and releases the side so that it may be lowered. The front side rail is placed just behind the movable side so does not show in the photograph.

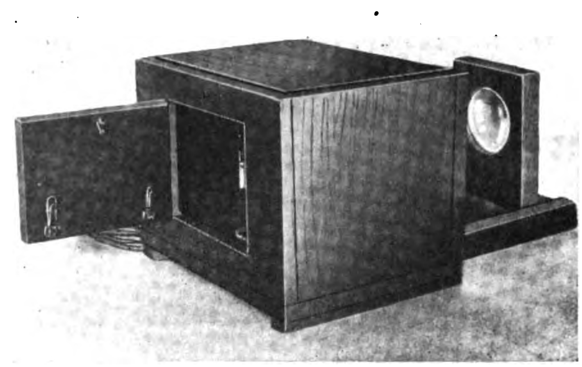
Cleats are fastened to the inside of the rails and slats to support mattress or springs resting on these.



DETAILS OF CHILD'S BED.



FRONT AND SIDE OF REFLECTOSCOPE.
Note slide for focusing pictures.



REAR AND SIDE OF REFLECTOSCOPE.
Ordinary "paper clips" are used as holders for the pictures.

HOW TO BUILD A REFLECTOSCOPE.

Written by an 8th grade, Duluth boy, as a project in a General Science Class.

A reflectoscope is a very simple form of a magic lantern, only it doesn't need transparent slides, but will show postal cards, photographs, etc.

First make a wooden or metal box six inches high, six inches wide, and nine inches long. Three-eighths inch wood is best. The box must be light-tight. A door four by five inches must be cut in the back. Hinges must be put on the door so it will swing. Two paper clips must be fastened on the lower corners and another on the top. A bolt or screw will serve as a handle. In front bore a hole two and one-half inches in diameter. A piece of tin fixed as in A must be put in the two corners as in the diagram, and two ordinary tungsten electric lights in receptacles before the tin reflectors, wired as in the diagram.

Editor's Note—This reflectoscope was built by an 8th grade boy at a cost of $1.90, divided as follows:

2 receptacles	$0.20
1 plug	.20
10 ft. lamp cord	.25
1 convex lens	.65
Lumber	.60
	$1.90

The boy became interested in lenses while studying general science and found in some magazine a description of how to make a reflectoscope. The story tells in the boy's own words how he did it.

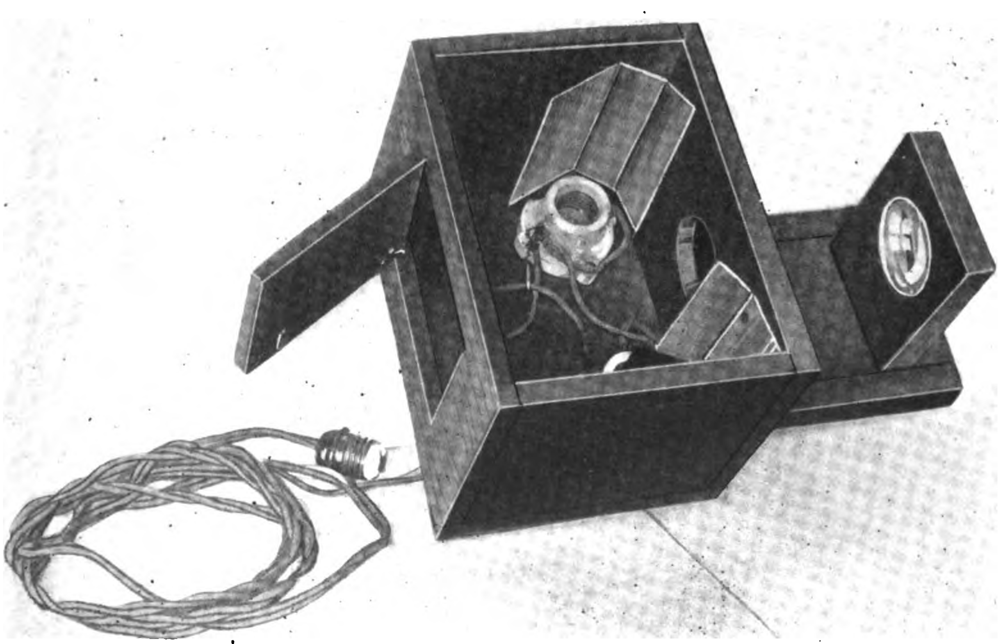
A board seven inches by five inches is made, then tack on each side a stick ¼ inch square by six inches long. Over this tack a stick ⅛ inch thick by ½ inch wide by 6 inches long. Next make a board 4½ inches by 2¼ inches, nail this on a board 3½ inches by 5 inches with a hole 2½ inches in diameter drilled through it one inch from the top. This will fit in the boards told about in the first part of the paragraph. I had a hard time to get the right kind of a lens, and tried to get one all over town. At last I had to send away to Sears, Roebuck & Company. A double convex lens 2½ inches in diameter is best, but you can use one from 2½ to 3 inches in diameter. Fit the lens in the board that slides back and forth so you can get the right focus.

Place a postal card in the clips on the door and then turn on the lights. Face the reflectoscope towards a white sheet and move the board holding the lens back and forth until the picture shows clearly. Large pictures will tend to blur at the corners, but this is on account of the lens, and cannot be helped.

FORGING A DRAW KNIFE.

Jay F. Knowlton, Junior College Shop Instructor, Hibbing, Minn.

The draw knife should be forged from a better grade of steel than our regular cast steel grade; however, very good results can be obtained from such grade if a little



VIEW OF REFLECTOSCOPE WITH TOP REMOVED.
The box measures 7" x 6" x 7"; the lens board is 5¾" high; the front opening is 2½" diameter; the rear door measures 5" x 6"; the front slide is 5½" wide.

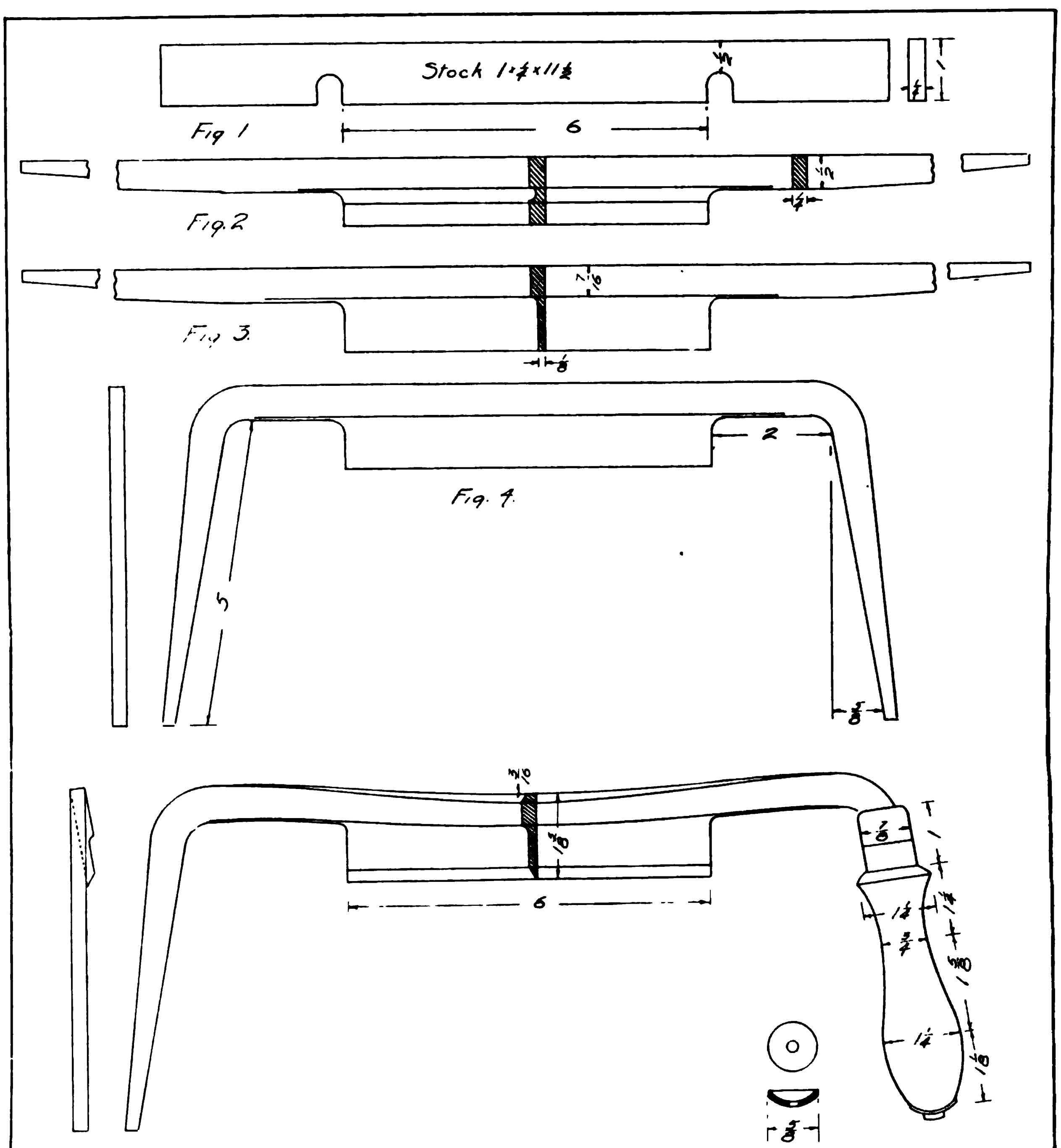
care is used in the finish hammering of the blade. If the blade is carefully worked it will hold a very good cutting edge.

The drawings show the method of forging a six inch blade draw knife. If an eight inch blade is wanted, simply add the two inches and forge the handles as shown.

The stock shown is one-fourth inch thick, one inch wide and eleven and one-half inches long. Start from the center of the stock and measure off the length of the blade, center punch and fuller as shown in Fig. 1. Now draw out the handles to size and note that they run one-fourth by one-half for two inches before the taper starts. The taper starts at the point where the bend will be made later. Leave the handles straight at present.

Now place the groove in the blade as shown in Fig. 2 with a fourth inch top fuller. This is the most difficult part of the work, as the groove must neither be too high nor too low, and at the same time it must be straight. If each handle has been carefully forged to one-half inch wide, little difficulty will be experienced. Start the fuller at each end first, then work to the center. Notice that the groove comes up in the handle a little and leave the back of the blade seven-sixteenth inch wide. The groove

THE COMPLETED DRAW KNIFE.



DETAILS OF DRAW KNIFE.

should be one-eighth inch deep, leaving the blade one-eighth inch thick.

The blade is now drawn out with a set hammer to the thickness required. This will cause the blade to curve backward which makes it necessary to straighten the back often. When finished, the blade has a little curve but it is better to have the blade straight until after the draw knife is ground and polished. The forging will leave the ends of the blade a little uneven, which should now be squared with a file, leaving the corner next to the handle round. The work should now be placed on a medium emery wheel and the rough hammer marks removed, after which it can be buffed on the 60 wheel.

Now see that the handles are the same size and length, and after marking the two inches for the bend with a center punch, bend the handles to the angle shown in Fig. 4. Now bend the handles back out of line with the blade as shown in the end view of the assembled drawing. The back of the draw knife can now be given the bend shown and the cutting edge can be filed straight. With a file or emery wheel, put on the three-sixteenth bevel shown on the back of the draw knife in the assembled drawing.

The wood handles can be turned on the lathe and a seven-eighth brass ferrule should be used as shown. After the handles are all finished there should be a three sixteenth hole bored through each, and the steel handles heated to a dull red and fitted into the wooden handle. This should be done slowly so as not to destroy the finish given the wood. The metal caps for the ends of the handles are made from sixteen or eighteen gauge soft steel or iron. They are cut into five-eighth inch round disks, raised with a ball-pein hammer over the hole in the anvil to fit the end of the wood handles and a three-sixteenth hole drilled through the center of each.

The draw knife should now be polished ready for tempering. The tempering is done by building a large long fire of coke into which the blade part of the knife is placed and allowed to remain without draught until it takes a medium red heat when it is quenched lengthways in oil. It is now polished and temper drawn either over a hot iron or the fire to the first shades of blue. The hot iron will no doubt give better result than the open fire as it is more easily controlled. Use a 1 by 2 piece and heat a sufficient length to draw the entire blade at one time. The back part of the blade can be drawn to a deep blue but the one-eighth inch thick blade must be stopped at the first shades of blue. The handles should be drawn until no temper remains including the part from the bend to the blade.

The draw knife should now be given a fine polish all over except the part that will be covered by the wooden handle. The knife is now ready for the handles which are to be held in place by the small steel disks.

There are several ways of fastening the disks on the handle. The most satisfactory is to file the ends of the steel shanks to three-sixteenth round and thread. Then place on the handle and disk and use a small nut to hold the handle firm. It can also be riveted but this makes necessary the heating of the tip of the handle so as to rivet more easily. Steel does not rivet well cold. After riveting you can clean it well, and give both disk and rivet a coat of tin which will even all and also take a polish. If a riveted handle is wanted, it is better to weld on iron or soft steel tips that will rivet more easily. If you cut threads on the steel handles, be sure to anneal the tips first.

TINTING FLOWERS.

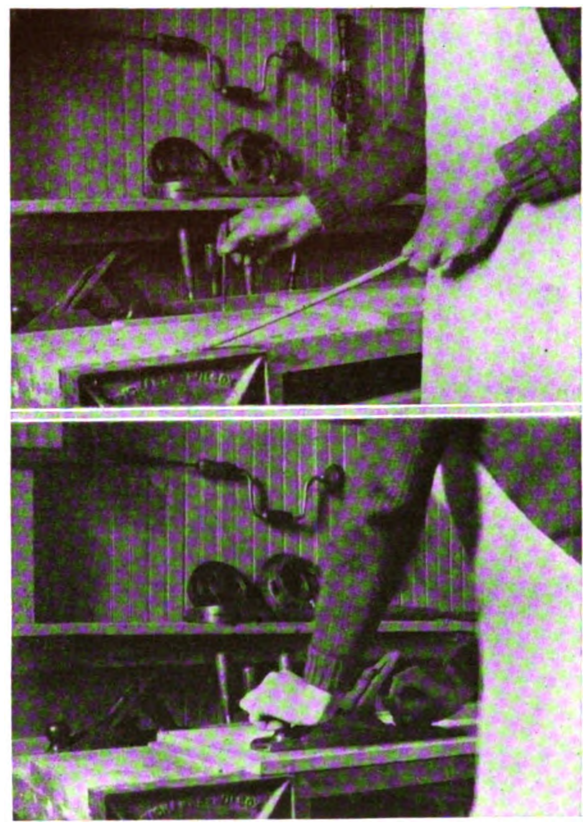
Bertha Morey, Ottumwa, Iowa.

The home milliner is often confronted with the problem of renewing faded hat trimming. Retinting flowers with a brush is uncertain and ruined flowers frequently result. To have satisfactory results the color, any cold dye, may be blown with an artist's atomizer. Mix the color in a medium tint, a second application can be made if the color is not dark enough. The leaves and berries may be dipped in the dye and dried as quickly as possible. A brush may be used to touch the centers of the flowers, the veining of the leaves and any markings on the fruit.

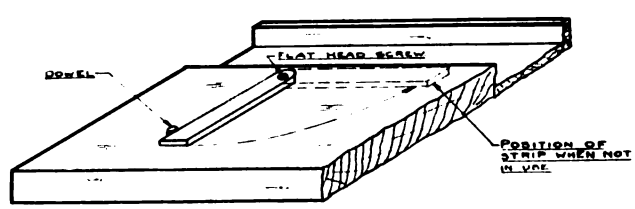
Velvet trimmings that have become rusty may be made to give longer service by blowing, with the atomizer, with gold or silver paint. The bottle must be well shaken or the metalic paint will be thrown on in large thick spots.

A BENCH STOP.

As a teacher who was a journeyman mechanic before he became an instructor, and who consequently, is prone to constantly compare average shop-school methods with those which experience taught him are "standard" in up-



ABOVE: THE STOP PUSHED BACK.



DETAILS OF BENCH STOP.

to-date commercial pattern and cabinet shops, may I suggest that the bench shop illustrated herewith be given a try. It long since received the approval of "graduate" mechanics.

Suitable dimensions for the strip are about $1\frac{1}{4}''$ x $\frac{1}{4}''$. The dowel—which may be any convenient diameter—should fit the hole snugly, and be somewhat longer than the thickness of the bench in order that its lower end may be easily reached with a hammer when adjustment is necessary.

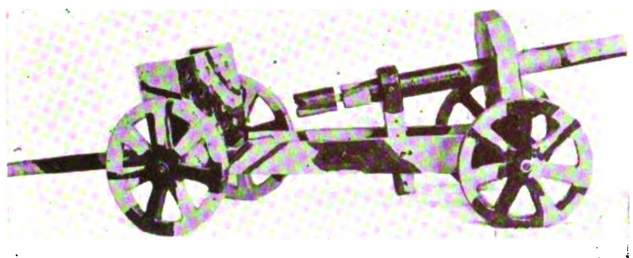
Poultry Houses. Farmers' Bulletin 113. Prepared by Alfred R. Lee, poultryman, animal husbandry division, U. S. Department of Agriculture, Washington. This bulletin, which has been written in simple style for the beginner, discusses briefly the arrangement and construction of poultry houses. It discusses especially the floor space, provision for small flock, for larger flocks, remodeling, and interior arrangement. A list of helpful bulletins is given for the benefit of members of boys' and girls' poultry clubs.

A TOY PROBLEM.

W. J. Knupp, Manual Arts Instructor, Harlan, Ia.

The accompanying picture and drawing shows in detail a very successful and interesting problem in toy-making as worked out by the author.

The problem requires a minimum amount of material and careful manipulation in assembling. The muzzle, axles, and plunger are made from a worn-out curtain roller. The wheels laid out from a templet and cut from ½" material. Templets for wheels of three, five and seven spokes were made, the seven spoke templet given to the fast and best workers.



TOY CANNON.

A rubber elastic fastened to each side at the rear end of the muzzle and around the end of the plunger places the toy in working order.

The problem is not a typical model until camouflaged with various colored paints.

TO REMOVE FADED STENCILING.

Bertha Morey, Ottumwa, Iowa.

Many pieces of handsome linen may be recovered for use if the faded stenciling is removed. Soaking over night or longer in half benzol and half wood alcohol will soften the oldest and dryest painted stencil. This mixture will not injure the material. It may be well to say that the paint does not just fall out. A good washing on the board and boiling in soap is needed to remove the design.

"WHO'S ABSENT?" A PRACTICAL SOLUTION.

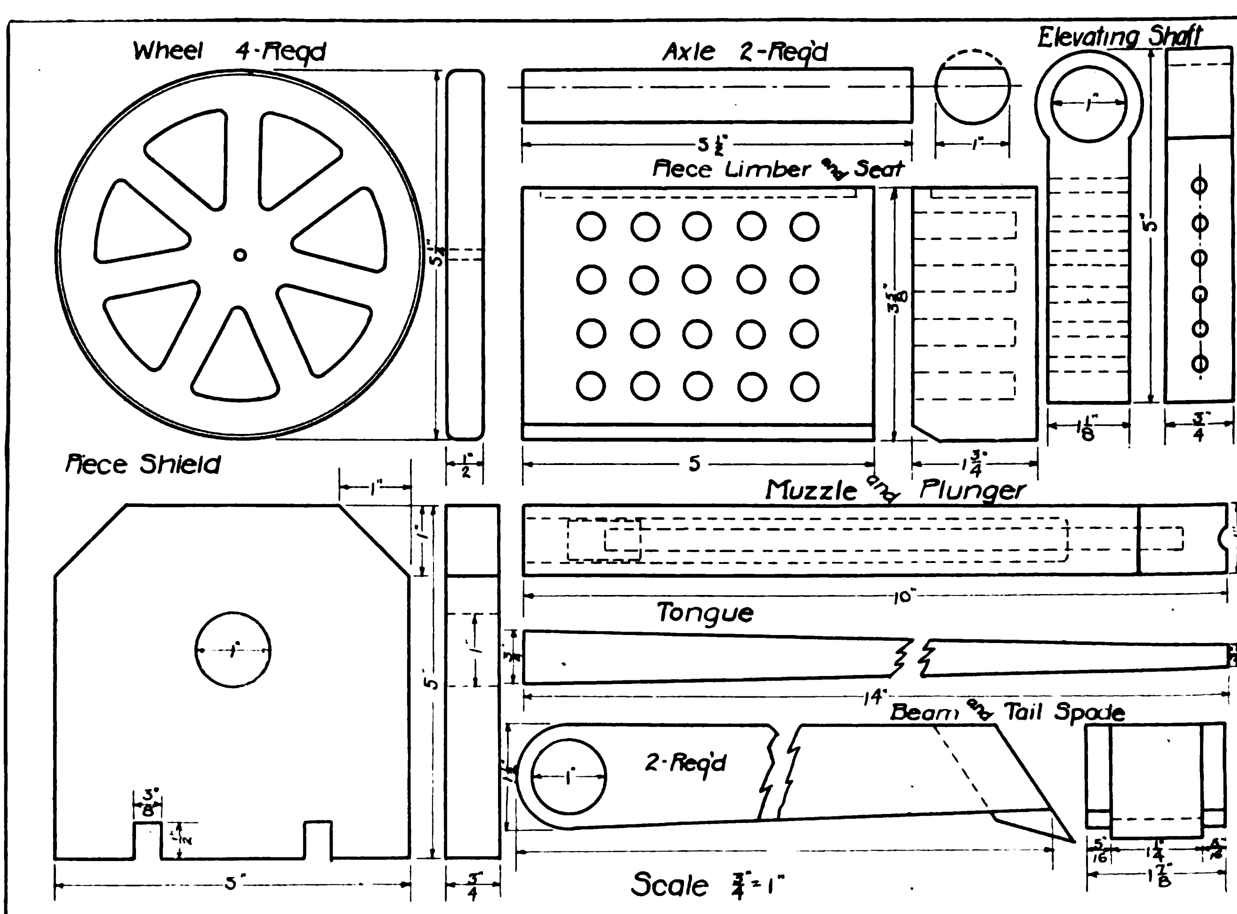
Wm. B. Miller, Holton, Kans.

Every shop instructor is crowded for time and is very liable to overlook the matter of calling the roll. Boys come into the shop and are very anxious to get to work

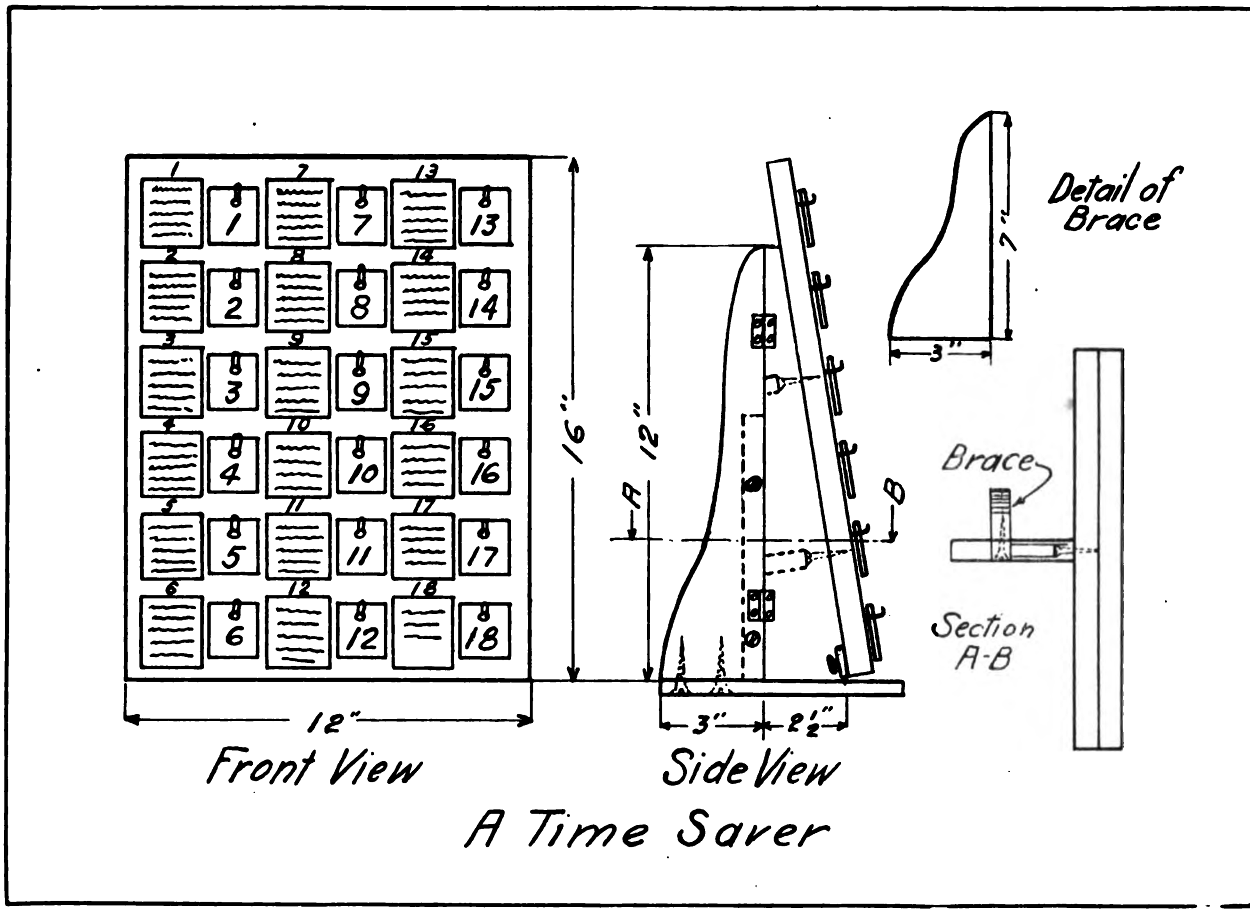
ATTENDANCE RECORDING DEVICE.

at once and do not like to sit still while the teacher calls the roll.

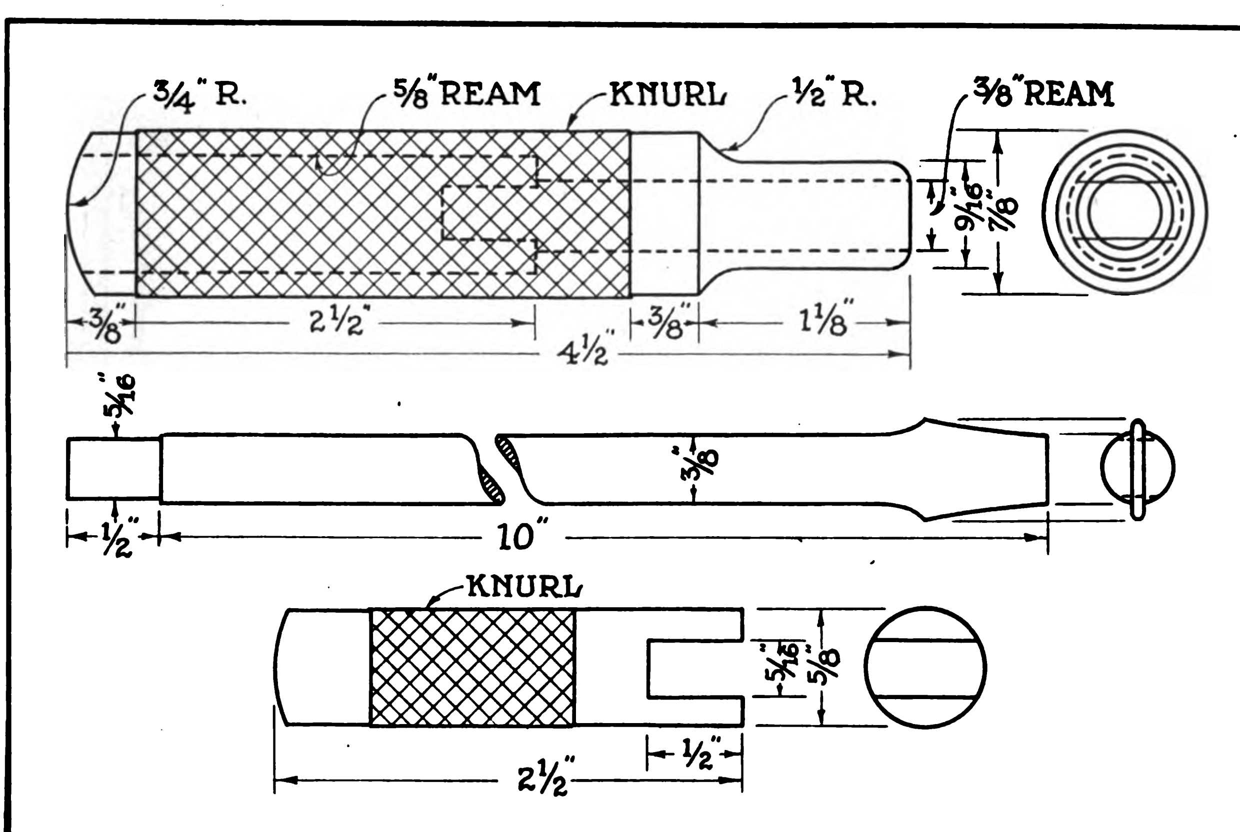
To overcome this the writer made the device described and uses it continually. It has proved to be a great labor saver and I think it is entirely practical in all shop and laboratory classes.



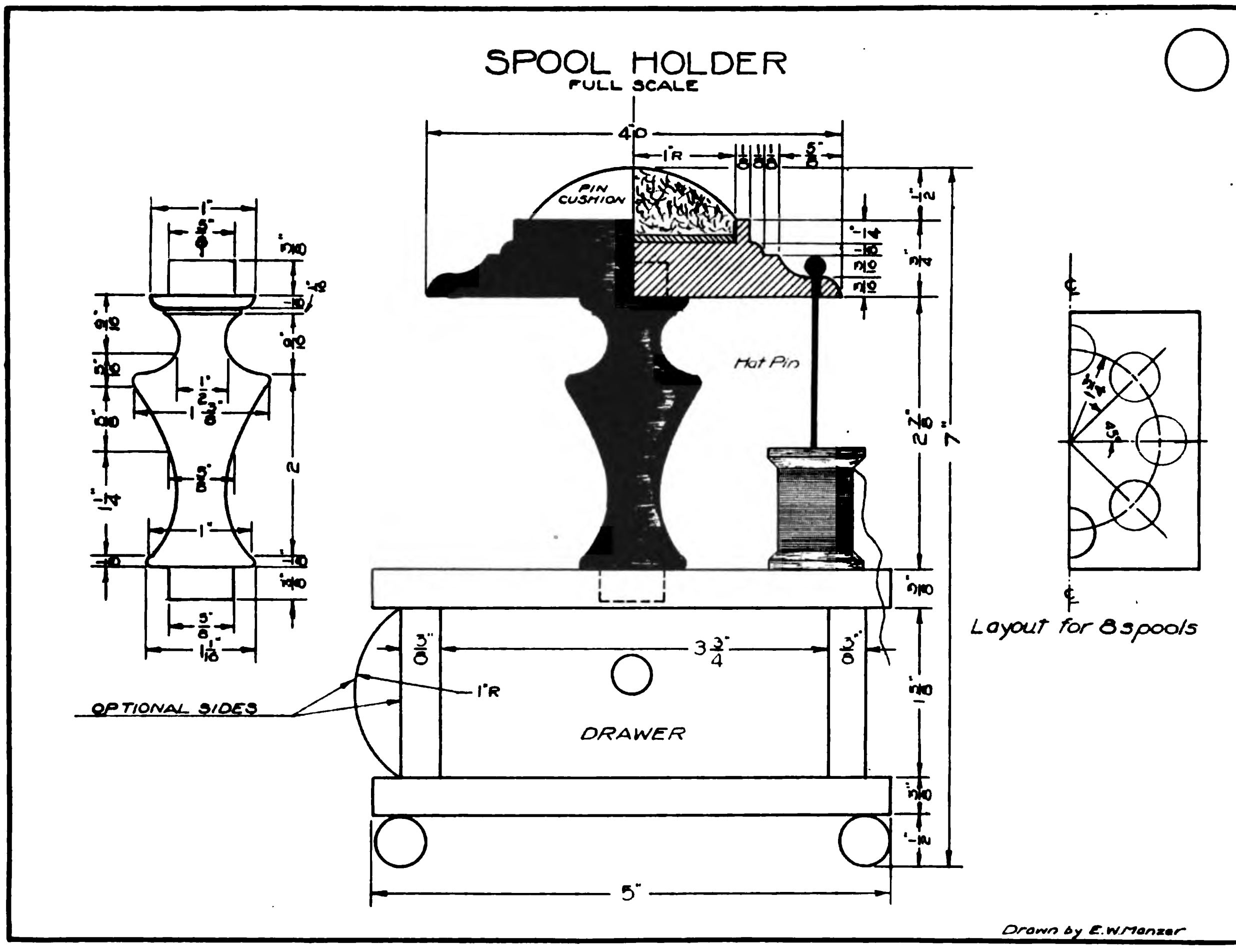
DETAILS OF TOY CANNON.



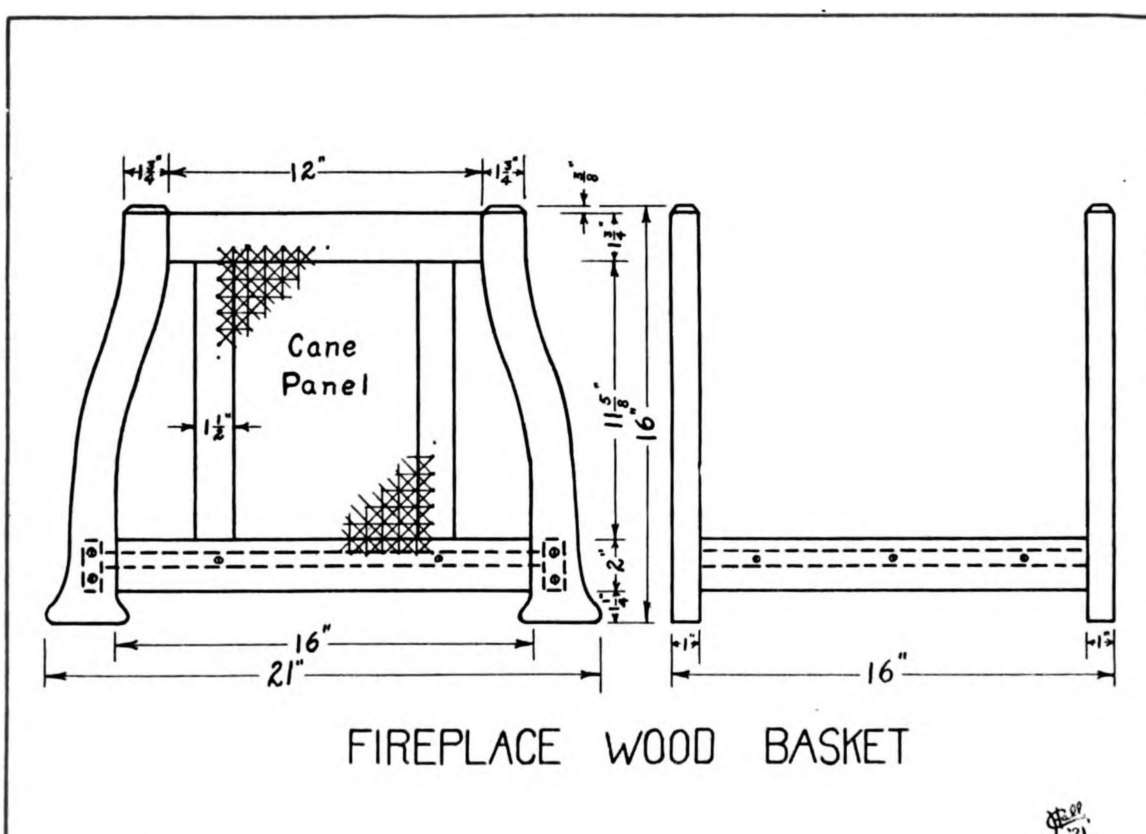
DETAILS OF ATTENDANCE RECORDING DEVICE.



DETAILS OF MACHINE SHOP PROBLEM.



DETAILS OF SEWING COMPANION.



DETAILS OF WOOD BASKET.

It consists of a board about 10" by 14" with screw hooks in it as shown. A small block, about 1½ by 2 with a number upon it and having a ½" hole in it, hangs upon the hook. By the side of the hook is a label holder, numbered, and holding a card with the names of the different pupils who use the bench of this number. These are arranged by classes to facilitate use. Tool checks, keys, etc., should have this same number whenever possible.

The device is advantageous in that the teacher marks the absentees only and pays no attention whatever, as far as the records are concerned, to those present. He marks the few instead of the many. As the boy enters the room he removes the block, containing his number, from the board and retains it during the class period. As he leaves the room at the close of the period he hangs the block on the hook ready for the next class.

After all have entered the classroom, removed their blocks, and been put to work; the teacher glances at the board and makes his record, counting those absent whose blocks are still on the hooks.

To make it a little more convenient for the teacher, the board is hinged to an upright support in such a manner that it can be held toward the pupils as they enter the room. Then by releasing a cupboard catch the board may be turned toward the teacher's side of the desk. When the teacher has marked the record it is easily swung back, and automatically locks itself in position.

A MACHINE-SHOP PROBLEM.

Edward Moeser, Depew High School, Buffalo, N. Y.

This problem will be of interest to the machine-shop instructor. The handle is made of cold-rolled steel; the plug is made of cold-rolled steel and knurled for driving it in the handle. The blades are made of drill rod and with three different lengths. The body or handle can be made for any size drill rod. It is a very live problem and the boys are not satisfied with one but will want to make several.

SPOOL HOLDER.

Emerson Wm. Manzer, Madison, Wis.

This useful article requires face and center turning, drawer construction, accurate planing, review of squaring up stock, finishing stock and serves as an excellent problem following wood turning and preceding cabinet making.

Students are demanding useful problems and this meets that important requirement.

The sides and draw front may be covered with moulding as is shown in the drawing.

WOOD BASKET.

C. H. Hall, DeKalb, Ill.

This basket was designed to hold kindling and other wood near the fireplace. A handle could be added if desired and it could then be used for carrying wood from the basement, altho the design is a little large and heavy for that purpose.

The basket is constructed in such a way that it may be used as either an eighth grade or high school problem. The sides are fastened together with ⅜" dowels. After

WOOD BASKET.

the caning is finished, the sides are fastened to the bottom board and end rails with round head screws.

Hickory splints or thin board panels could be substituted for the cane if desired.

A NEW VOCATIONAL HIGH SCHOOL.

The new Vocational High School at Okmulgee, Oklahoma, which has been under construction for the past year, is now ready for occupancy. The building is declared by experts to be one of the best plants in the entire southwest for instruction in vocational courses.

The building is a three-story brick structure. On the first floor are the automobile, carpentry and electrical shops. The automobile shops are adequately equipped with the necessary machinery to be used in general automobile repair work. Storage battery, tire repair, vulcanizing and acetylene welding rooms are also provided. The carpentry shops are so arranged that small portable buildings may be moved in and out of the shops and the students are afforded ample opportunity for practical work in house building and interior finishing work. A partially completed miniature house in the electrical shop affords opportunity for practice work in the wiring of houses.

The second floor of the building is occupied by the home economics department which is equipped with those things needed for adequate instruction in the various classes. Two rooms on this floor are given over to the medical clinic and a part of the floor is occupied by a girls' gymnasium.

On the third floor there are science laboratories, classrooms and the commercial department, which is equipped with a miniature bank with vault and three tellers' windows.

A winding stairway leads from the floor to the roof, on which is located a roof-garden where growing beds and greenhouse equipment have been installed. Here instruction in floriculture and kindred subjects will be given. There are office rooms, store rooms and rest rooms which serve each department and add to the convenience and pleasure of instructors and pupils alike.

The Superintendent of Schools is Mr. H. B. Bruner who, after an extended visit with experts in vocational education in several of the states, has obtained the best instructors available. A consistent effort is made to carry out in school practice the things which have been and are taught in leading pedagogical schools.

It is contemplated that courses taught in the new school will include automobile mechanics, electric motor repairing, electric wiring, telegraphy, printing, carpentry, interior decoration, arts and crafts, sheet metal work, oil analysis, salesmanship, banking, business law, bookkeeping, stenography, typewriting, cooking, millinery, dressmaking, nursing, floriculture, expression, music, and physical education.

TRADE AND INDUSTRIAL EDUCATION IN OKLAHOMA.

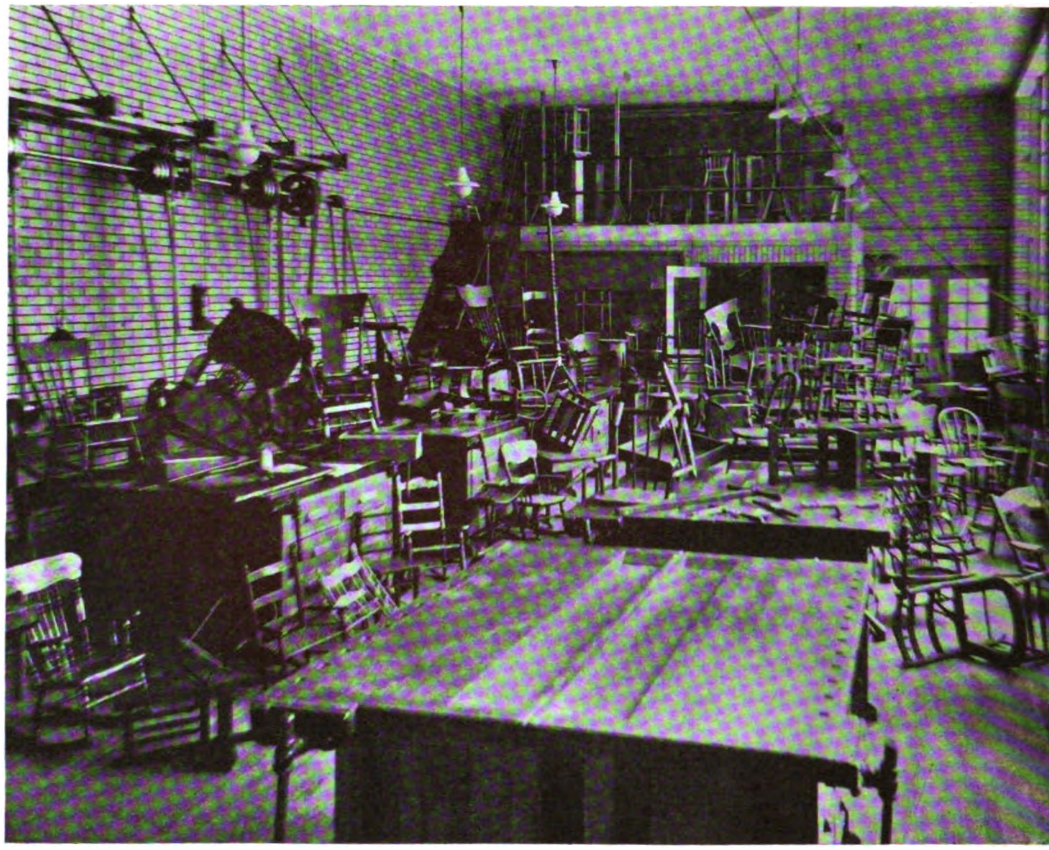
Henry F. Holtzclaw, Supervisor, Trade and Industrial Education.

The provisions of the Smith-Hughes Act as passed by the 64th Congress were accepted by the sixth legislative session of the state of Oklahoma and approved by the Governor on the 24th day of March, 1917, in House Bill 213. The state treasurer was designated custodian of all funds allotted and a state board of vocational education was created. The board consisted of the chairman of the board of education, the president of the board of agriculture, the president of the University of Oklahoma, the president of the A. and M. College and a member, designated as secretary, to be appointed by the governor.

Since the appointment of the first secretary, vocational education as carried on by the state of Oklahoma has met with encouraging success. At the present time Oklahoma ranks well with other states of its size and age in the development of the program of vocational education and this is particularly true in the field of trade and industrial education.

There are eight cities in the state in which there are given trade and industrial courses meeting the requirements of the state and federal plans and are, therefore, subject to reimbursement from state and federal funds.

Under the state plan the number of day-unit trade



FURNITURE FROM HOMES TO BE REPAIRED BY THE BOYS OF SOUTH HIGH SCHOOL, LIMA, O.
Harvey C. Robinson, Instructor.

schools has increased to five and day-unit trade classes to ten. Instruction is given in carpentry, printing, automobile mechanics, machine shop practice and shoe repairing. Instruction in related subjects includes mechanical, architectural and typographical drafting, applied mathematics, electric wiring and repair, applied science, press work and book-binding.

Two evening schools have been approved and the plans for a third school have been formulated. Courses given in the evening schools are, automobile mechanics, drafting, carpentry, practice shorthand and typewriting, garment making, millinery, home nursing, dietetics, business English, business arithmetic, journalism, salesmanship, business law, practice telegraphy and comptometry.

Part-time and general continuation schools are in operation at Tulsa and Oklahoma City and at the Sand Springs Colored school. Five teachers are employed. A director for evening and part-time work has been appointed by the superintendent of schools of Okmulgee and we expect another creditable part-time school to be added to our program.

Teacher training is carried on by the board in a very limited way. A course in foreman training in which twenty head foremen of the Cosden Oil and Refining Company of Tulsa were enrolled, has recently been completed. The conference lasted for two weeks, was promoted by the director and by the supervisor of trade and industrial education and was conducted by Frank Cushman, special agent for industrial education for the Federal Board for Vocational Education.

Each member of the staff of the Board of Vocational Education is devoting nine weeks of time to a course in "Organization and Administration of Vocational Education" to be given in the summer schools of each of the six State Normal Colleges, the University of Oklahoma, the A. and M. College and Phillips University. Credit is given to those who satisfactorily complete the course which is a study of the development of modern industrial institutions and their educational significance, general provisions of the Smith-Hughes law, state boards, and state plans, types of vocational schools and special provisions for each type. Attention will be given to administration and supervision of teacher training, industrial surveys, scientific management and training for industrial occupations. In the University of Oklahoma the course is known as Education 180 and three hours' credit is given for successful completion.

New Books and Pamphlets.

Automotive Ignition Systems.

By E. L. Consoliver and G. I. Mitchell. Cloth, octavo, 269 pages. McGraw-Hill Book Co., Inc., New York.

This practical book has been developed from the author's correspondence and lecture courses for electricians and automobile mechanics. It covers the principles of electricity and magnetism and describes the construction and operation of the principal types of ignition batteries, jump-spark ignition systems, battery ignition, low-tension magnetos and inductor types. The two final chapters take up the special details of the care and repair of apparatus and "trouble shooting." The text is of the popular-technical type and emphasizes the simple facts of the best type of devices now in use rather than the engineering principles upon which they are based. The illustrations are clear and fulsome. The book measures up to the high standard set by the University of Wisconsin Engineering Education Series.

Permodello Modelling.

By Bonnie E. Snow and Hugo B. Froehlich. 46 pages, illustrated. The Prang Co., Chicago, New York.

This book suggests an interesting form of applied art work for high schools. Permodello is a prepared modelling clay containing a binder which gives it unusual modelling qualities and dries without shrinking or cracking to a stone-like hardness. The book describes very accurately the best methods of working the material and suggests a wide variety of useful and ornamental articles which may be constructed. The chief value of the book is in the artistic design and color combination which the senior author has worked out.

Needlecraft for Older Girls.

By Margaret Swanson. Cloth, crown octavo, 111 pages, illustrated. Longmans, Green & Co., New York.

This book offers suggestions for a course in needle-

work for girls between the ages of 14 and 18. It emphasizes originality in design and suggests in the progressive problems, definite principles in design which are to be applied. In the selection of problems and the progressive difficulty of the design, choice of colors and materials, the natural instincts and interests of the girl are definitely used to hold the attention and fix the objective. Thus the earlier lessons recognize the desire of possession and the later work reflects the approach to wifehood and its natural responsibilities.

While much of the material in the book may not meet the approbation of American teachers and pupils who slavishly observe "style" in the needlework courses of our high schools, the underlying idea of the book cannot fail to command attention and respect. The principles laid down are fundamental to any course in needlework that would be more than merely utilitarian.

Carpentry for Beginners.

By William Fairham. Cloth, 12mo., 217 pages. J. B. Lippincott Co., Philadelphia, Pa.

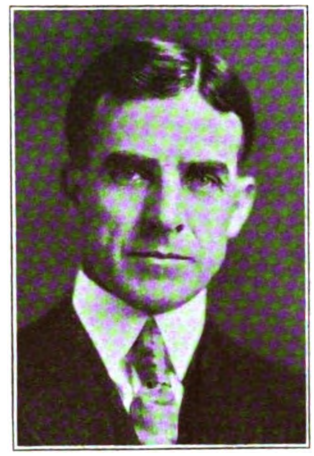
This book is intended for the home carpenter or amateur woodworker and presents fundamental information on tools and woodworking processes. A series of projects, including simple cabinet work and home and garden carpentry is developed simultaneously with the formal descriptions of processes. There is considerable material of the familiar coat hanger and nail box type, but quite a few of the problems are different and quite interesting.

It is to be regretted that the publishers have not taken better account of American usage, but have left unedited all of the author's British trade language and suggestions for the use of more or less obsolete tools.

"Needs and Opportunities in Industrial Arts" is the title of an interesting little pamphlet just issued by the Philadelphia School of Design. The pamphlet is a reproduction of an address delivered by Dr. James Parton Haney at the School of Design, and discusses in particular ideas and ideals of art in years past, post-war conditions, art for use, training the many and the few, the art schools needed, opportunities and needs, lessons of the war period.

Suggestions on the Manufacture, Sale, Repair of Rubber. Home Service Circular 6-D-1, Junior Achievement Bureau, Eastern States League, Springfield, Mass.

TWO IMPORTANT CHANGES.



MR. S. J. VAUGHN,
President-Elect Hardin College,
Mexico, Mo.

ROYAL B. FARNUM,
Principal-Elect, Massachusetts
Normal Art School,
Boston, Mass.

O. H. Benson, Director. The project begins with the repair and salvaging of rubber articles and includes a first-hand study of all that the community has in the way of making, selling and repairing of rubber goods. Demonstrations are suggested along the line of making, testing, selling, using, care or repair of rubber articles.

Proper Treatment for Floors, Woodwork and Furniture. 25 cents. S. C. Johnson & Son, Racine, Wis. A booklet prepared especially for architects, contractors, painters, interior decorators and people building new homes. Gives detailed information on the proper way to finish new and refinish old woodwork, floors and furniture.

Home Laundering. By Lydia R. Balderston. Farmers' Bulletin 1099, U. S. Department of Agriculture. The pamphlet tells how the drudgery of laundry work may be overcome by using good supplies, proper equipment and following the best modern methods. It takes up the arrangement and equipment of the laundry room, methods of laundering, and special cleaning and pressing.

FURNITURE AFTER IT WAS REPAIRED BY THE BOYS OF SOUTH HIGH SCHOOL, LIMA, O.
Harvey C. Robinson, Instructor.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them.. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Boat Building.

199. Q:—I am desirous of finding plans for a canoe. —F. R. W.

A:—"Optic's Boat Builders' Series," $1.25, Lothrop, Lee & Shepard, Boston; "Beard's Boat Building," $1, Chas. Scribner's Sons, New York; "Moore's Manual Training Toys for the Boy's Workshop," $1, Manual Arts Press, Peoria, Ill.; "Hasluck's Building Model Boats," $0.50, Funk & Wagnalls Co., New York; "Neison's Practical Boat Building for Amateurs," $1, F. J. Drake, Chicago; "Yates's Boy's Book of Model Boats," $2, Century Co., New York; "Hall's How to Build a Canvas Canoe," Lothrop, Lee & Shepard; "Stephen's Canoe and Boat Building," $2, Forest & Stream Publishing Co., New York; "Vaux's Canoe Building," $1, Forest & Stream Co; "Stephens' Boat Building Plates," Forest & Stream Co.; "Hall's The Boy Craftsman," Lothrop, Lee & Shepard; "Miller's Canoeing and Sailing," Geo. H. Doran Co., New York.

Refinishing a Beech Floor.

200. Q:—I would like to consult you in regard to some new beech floors which we have. We were anxious to have them a walnut brown and were given Bismark brown to stain them. This was done with the result that they are red. We were told that there was probably tannin in the beech, which caused the change in color. Can you tell us what to do in order to get a rather light shade of walnut brown? Three floors have been stained with the Bismark brown, two of them have been varnished with one coat of valspar.—E. R.

A:—Where beech floors have been stained with Bismark brown and afterwards varnished, the only recourse which remains is to entirely remove the finish and color by mechanical sanding machine or handscraping and sandpapering. It is the absence of tannic acid, rather than its presence, which is responsible for the red tone of the Bismark brown. This color is used principally in the textile industry where in an acid bath it develops a rich, full bodied brown color. As usually applied to wood, however, it furnishes a rather broad range of mahogany and red.

It is possible to mix water soluble Bismark brown and water soluble nigrosine to produce any shade of brown which is desired and if a warmer, brighter tone is needed, a little water soluble yellow aniline will accomplish the result. It is best to entirely resurface the floors to new wood, apply the stain in full body, endeavoring to stain all floors at once wherever practical, thereby ensuring an evenness of tone thruout.

After drying 24 hours the whole floor should be gone over with a brown silex filler made up to a warm or red chocolate brown which can be secured by the use of burnt sienna or better still rose lake and Van Dyke brown. With this thin filler the inherent unevenness in hardness and softness of beech can be overcome and the small cracks in the joints will be filled up so that the whole varnish floor will present a much better appearance than can be otherwise secured.

Avoid the use of shellac under varnish for floor work. It has been our practical experience that two coats of Pratt & Lambert's No. 61 Floor Varnish will produce a better job than the varnishes which you have been using. —Ralph G. Waring.

Finishing Red Gum.

205. Q:—I would like to know how to finish quarter sawed red gum (figured) so that it will show the peculiar grain it has in the natural. I tried it as mahogany but all of the graining was obscured.—M. B. M.

A:—Carefully sand the figured gum in order to bring it up to perfect mechanical condition. Dust off and apply a coat of material made as follows:

Turpentine 1 quart.
Linseed oil ½ cup.
Japan drier 2 tablespoons.

This should be brushed on carefully and evenly and allowed to dry at least one week in a warm room, free from dust. Give a sizing coat of white shellac from stock reduced one-half with alcohol, dry five hours and sand glass smooth.

Dust off and apply a well brushed out coat of Pratt & Lambert No. 38 varnish which when hard and dry should be sanded smooth and free from defects. A second coat of varnish should then be brushed in full body; when hard and dry rub out with water, felt pad and FF pumice stone to a medium gloss. Clean up with a good oil polish ready for use. The object of this treatment is to emphasize the natural cream and brown streaks and at the same time soften the tone of these portions. The finish should be kept as thin as possible in order that its transparency may seem to be part of the wood itself rather than the result of many coats of heavy bodied varnish. It is for this reason that No. 38 has been specified instead of No. 61 varnish.—Ralph G. Waring.

Finish on Trunk.

213. Q:—(1) A coat of "silicate soda" was put on a trunk, varnish over that and in a week the trunk looked as if it had been immersed in a salty brine. The trunk was rubbed down, a coat of paint put on and then varnish was added, but the varnish would not finish smooth. It looked as if there was oil in the varnish. Now what causes the varnish to do that and is there a way to put a good finish on the trunk?

Q:—(2) Could you tell me where I could get books of instruction on caning?—F. G. B.

A:—How in the name of all that is reasonable anyone can use silicate of soda as a sizing material is beyond comprehension. There are a few instances where it is used industrially, as in the polishing of wood casters and in fireproofing of certain tool handles. In these instances a good polish is secured only under special conditions. It is impossible to produce a good finish with silicate of soda under paint or varnish. Water glass, as it is commonly spoken of, is very unstable at all times especially after exposure to the atmosphere which causes it rapidly to go to pieces and to assume a chalky condition.

The varnish manufacturer should not be given the blame for a faulty finish when the foundation of a job is entirely faulty. Varnish is made up of oil and gums and it must not be assumed that it is inferior or defective when a material like water glass is used.

The only thing that can be done with this trunk is to use a varnish remover and hot gold dust suds to entirely remove the mess that is now on the trunk. It should be allowed to dry two or three days and then should be thoroughly washed with vinegar to neutralize the free alkali of the soda solution. The trunk should be allowed to dry 24 hours or longer after the application of the vinegar and then should be coated with a well brushed finish of a manufactured floor paint tinted to cover the stains and spots. After the color coat has dried from five to seven days it should be given a medium coat of a hard varnish like Pratt & Lambert's No. 61.—Ralph G. Waring.

A:—(2) The following are good books of instruction on caning: "Seat Weaving," by L. Day Perry, Manual Arts Press, Peoria, Ill.; "Chair Seating with Cane and Raffia," by John H. Jinks, J. L. Hammett Co., Cambridge, Mass.; "Problems in Woodwork," by Edward F. Worst, Bruce Publishing Co., Milwaukee, Wis.

Oil Engines.

214 Q:—I am desirous of securing a book which explains the construction and operation of some of the modern American-made stationary kerosene engines.—A. H. L.

A:—"Morrison's Oil Engines," $5, McGraw-Hill Book Co., New York; "Collins' Gas, Gasoline and Oil Engines," $1.25, D. Appleton & Co., New York, Chicago; "Hiscox' Gas, Gasoline and Oil Engines," $2.50, N. W. Henley Co., New York; "Wimperis' Internal Combustion Engine," $3, D. Van Nostrand Co., New York.

Bulletin of Evening Courses, Toledo, O. The pamphlet gives the requirements for enrollment, and offers outlines of courses in trade and vocational subjects for men and women.

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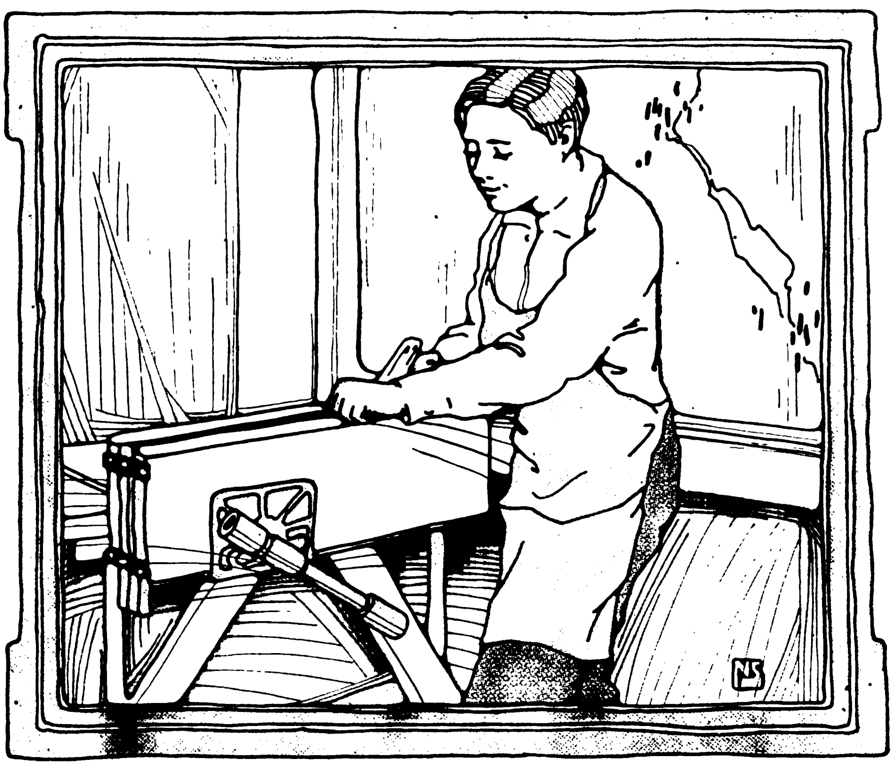
1921

THE INDUSTRIAL-ARTS MAGAZINE



AUGUST - 1921

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EDITORIAL CONTRIBUTIONS

The Board of Editors invites contributions of all kinds bearing upon the Industrial-Arts Education, Manual Training, Art Instruction, Domestic Science, and related subjects. Unless otherwise arranged for, manuscripts, drawings, projects, news articles, etc., should be sent to the Publication Office in Milwaukee, where proper disposition will be made. The Board of Editors meets each month, and all contributions submitted are given careful attention. Contributions when accepted are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

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INDUSTRIAL-ARTS MAGAZINE

Volume X AUGUST, 1921 Number 8

Pioneering in Manual Arts Teaching in China

F. A. Foster

THE awakening of China, dating from the abolition of the old literary examination system, in 1905, has stimulated a wide-spread desire for more and better education along lines which will help in the economic development of the human and material resources of the country. To this end technical, industrial and trade schools are being established and, in spite of the old prejudice against a scholar getting his hands soiled with labor, these schools are rapidly gaining in popularity. These efforts are divided between various private Chinese schools, the government schools and those established by the several missionary bodies. These efforts are, however, not well coordinated, as yet, nor as well financed as in America.

The recognition of the value of manual-arts schools is evinced by several normal schools which specialize in preparing teachers for this kind of work. This is a good beginning as it is the foundation work for spreading such instruction as will gradually enable them to expand to a nation-wide system in the course of another generation. As is to be expected in a country undergoing such great changes as China at the present time, the matter of education is not receiving as much support from the government as it ought. Then, too, there are old time prejudices to be overcome and a clearer vision to be developed, which take time and constant effort on the part of those who have come to realize the true value of such work. In some of the schools that have been started there is an evident lack of vision as to the scope and importance of this, to them, new departure in education, but this is not to be wondered at, for they have no past experience on which to base their efforts. It will be some years yet before they are well established.

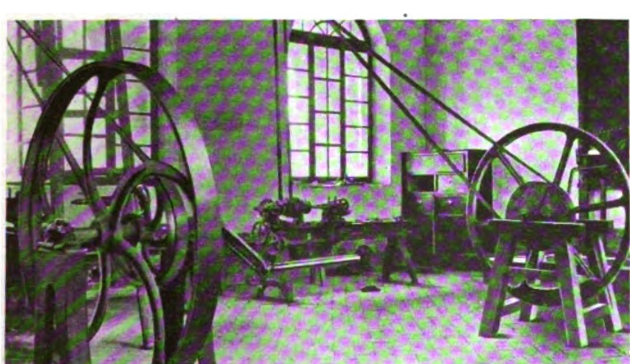


FIG. 1. YU TE MIDDLE SCHOOL MACHINE SHOP WITH HAND-DRIVEN LATHES IN 1916.

FIG. 2. STUDENTS OF YU TE SCHOOL AT MOLDING.

A more or less successful effort has been made to get the teachers and others interested in this work, organized so as to increase the efficiency of the work by cooperation, but there remains much to be desired in this direction. The introduction of the best foreign experience is greatly needed but it should be applied with proper consideration for the conditions here which are different from those in America and Europe. This involves either the education of a large class of young men and women of recognized ability for this kind of work, or the introduction of numerous foreign teachers, or both.

The National Association of Vocational Education in China.

One of the most notable efforts for promotion of this type of education is that of "The National Association of Vocational Education of China." This Association was initiated by Doctors P. W. Kuo, Huang Yen-pei and other progressive educators in the spring of 1917. As a result of their efforts a wide-spread interest was developed by lectures, lantern slides and industrial investigations, carried on not only in the north but also in the south and even into foreign countries where

FIG. 3. PRACTICAL FOUNDRY WORK AT YU TE SCHOOL.

there were populous Chinese settlements, as in Singapore, Penang, the Malay Peninsula, Java and Sumatra. Besides this work there has been considerable done by publishing a monthly magazine and some books in the Chinese language, on vocational education, elementary woodwork, a teachers' guide to vocational training in primary schools, etc. The association has an enrollment of 2,298 ordinary, 328 sustaining and 130 life members who are scattered in different provinces and also among the oversea Chinese.

The Chung Hua (Chinese) Vocational School.

For the purpose of making experimental work available to the members of the association and setting up a model for the reference of people interested in vocational education in the Republic of China, the Chung Hua Vocational School was opened at Shanghai in the spring of 1918. As a result of investigations made in the district in which the school was located it was found that the residents were mostly engaged in the trades of the woodworker and blacksmith. To meet the demand of the locality, courses in woodwork and ironwork were first established, in the fall of 1918. Later it was found that enameling and button making were simple in art but good in profit, so in addition, these two courses were added as an incentive to new trade among the people.

In these four courses enrollment is open to graduates from high primary schools in which they are to be educated for three years. There are workshops in the school where the pupils work half a day, spending the other half in the classroom. The school also admits apprentices and trains them to be workmen.

In the fall of 1919 a training course for teachers in vocational education was offered to graduates of middle schools (The middle school corresponds practically to the high school in America) for a period of a year, during which they should apply themselves to shopwork. This was done because the vocational schools which had been organized in various localities, after the model of the Chung Hua Vocational School were lacking in teachers. Later arrangements were made with La Societe Franco-Chenoise d'Education to open a preparatory course in the school for one year, receiving the middle school graduates who are prepared to go to France to study. They are being taught French and shopwork in the school.

A notable feature of this vocational school is that the disciplinary work of the school is left to the students themselves in the form of self-government. Anything that can be controlled by the students is not interfered with. This has a very salutary influence in building up initiative and self reliance so much needed by such students.

FIG. 4. YU TE MIDDLE SCHOOL, CLASS IN WOODWORK AND PATTERNMAKING. NOTE CRUDE BORING APPARATUS AT EXTREME LEFT.

The amount of money put into building and equipment for the school since its opening exceeds $50,000 and the running expenses are about $26,000 annually. The increasing number of students from different places wishing to enter the school, and the orders from factories for the manufacture of different goods have caused no little congestion in the school. The work of extension is now under consideration.

Since the opening of this school, many other schools of the same type have been planned in Soochow, Wuhu, Nantung, Swatow, in various places in Szechuan Province and elsewhere. Some of these schools have already started while others are under preparation. The Cotton Mill Association, in Shanghai, is also fostering the idea of opening a school covering the cotton and iron industries.

The English Language in Chinese Schools.

Instruction in scientific, technical and industrial subjects in the Chinese language is greatly hampered by the lack of a uniform system of accurate terms and expressions applicable to such subjects. The past life and education of the people has been such that there has been no call for them. In the past, provincialism has been a notable characteristic of the people. The language which varies greatly in the different provinces, makes it difficult to secure uniformity. In preparing books on subjects of a scientific or technical nature, it is desirable that the expressions used shall be uniform and convey the same meaning in all places. These conditions have combined to bring in the use of the English language in the higher schools. This has largely been helped by the missionaries, a large majority of whom use that language in the mission schools in the more advanced studies. At present the English language is studied in a great many of the middle schools, much as French or German or Latin is studied in our high schools in America. It is no uncommon experience at some of the higher Chinese schools to hear two students from different provinces using the English language instead of the Chinese, in order to make themselves understood. In the higher institutions like Pei Yang University, in Tientsin, Tsing Hua College, in Peking and Tangshan Engineering College, Tangshan, a large part of the instruction is given in the English language.

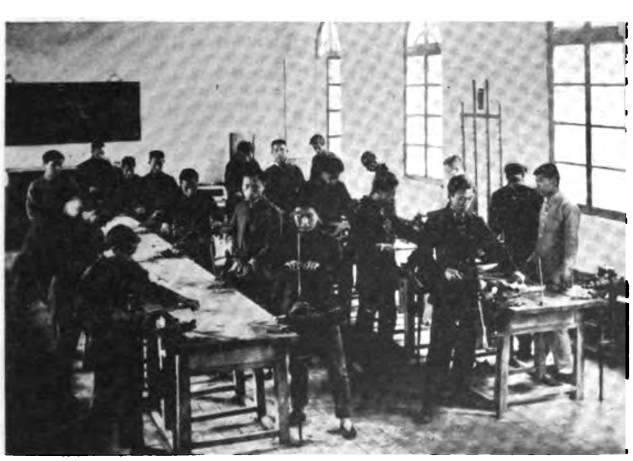
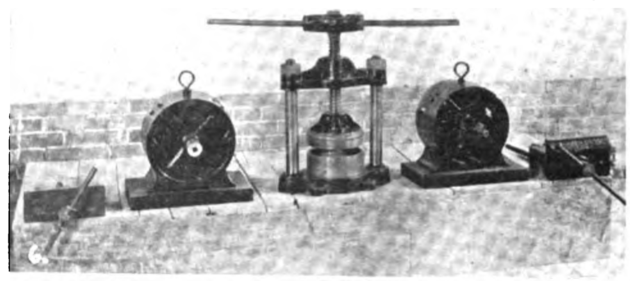


FIG. 5. METAL BENCH WORK IN YU TE SCHOOL. Student in middle foreground is using a "pump" drill.



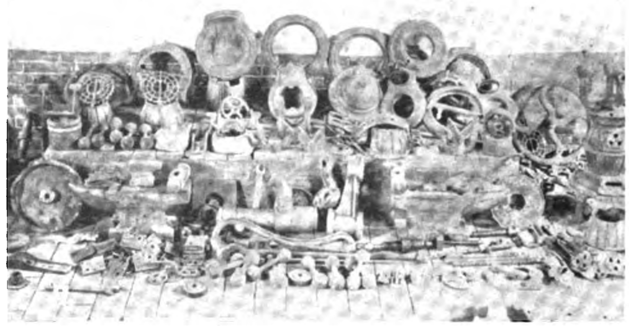


FIG. 6. VISES, MOTORS AND PRESS MADE IN YU TE SCHOOL. FIGS. 7 AND 8. CASTINGS AND PATTERNS MADE IN YU TE SCHOOL.

A number of committees, composed of foreigners and Chinese who have been educated abroad, are engaged in the difficult task of systematizing and unifying Chinese scientific terms which will, it is hoped, be adopted throughout the country. Already substantial progress has been made. The recent adoption of an alphabetic system may have far reaching influence in simplifying the language difficulty by greatly reducing the work of learning to read and write. The difficulty of learning the old idiograph characters has stood in the way of many of the people learning to read. The new system is so much simpler that it will place books and the ability to read them within the reach of nearly everybody. Another generation should see a great change in these matters.

The Yu Te Middle School, at Paotingfu.

A quite notable effort at introduction of industrial education is that of the Yu Te (pronounced Ye Deh) Middle school, at Paotingfu (pronounced Boughdingfoo), in Chihli (pronounced Jer-lee) Province. This is a private school with, at present, about 450 students, of which about sixty take the industrial course annually.

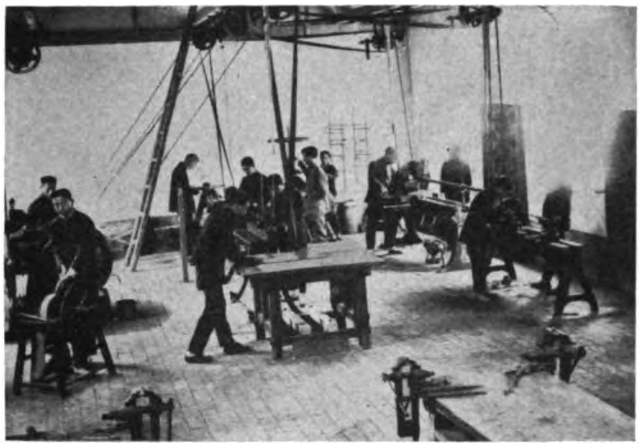


FIG. 9. MACHINE SHOP OF YU TE SCHOOL IN 1919 WITH OIL ENGINE AND NEWER MACHINERY.

Starting from very humble beginnings about fifteen years ago, they have built up a very enviable reputation for thorough and efficient work. Although their equipment is not as extensive as some other schools, the spirit with which the work is carried on makes the work done there of considerable importance in its potential effect on the field of industrial development.

The first work undertaken in the shops of this school was entirely in the line of woodworking. About four years ago they came into possession of two old Japanese lathes, copies of some ancient European type and they started on a metal-working course. As they had no engine to drive these lathes, they were compelled to rely on the usual Chinese source of power, viz., hand power. Fig. 1 shows their machine room as it appeared at that time. The lathes are driven by turning the cranks of the two countershafts set up on stands on the floor.

The following year they were presented with a five-horse-power oil engine from America which they installed in a new shop. With this addition they were able to start foundry work by using the power for a rotary fan for the blast for the cupola. Figs. 2 and 3 show the students engaged on foundry work. The cupola is the usual Chinese type of a very short stack mounted on a collecting basin which is mounted on trunions. The iron is taken off as it accumulates in the basin by tipping the whole stack by means of a handle at the back.

Through the generosity of some members of the National Machine Tool Builders' Association, they have now acquired a Steptoe shaper, a Seneca Falls Mfg. Co.'s lathe, a Mueller Machine Tool Co.'s tool room lathe. Several other machines have been promised which have not yet arrived. The most recent gift to this school has been that of a fifteen H.P., throttle controlled "Novo" oil engine contributed by the makers. Figs. 4 and 5 show bench work in wood and metal and Figs. 6, 7, 8, show products of the shop. Great effort is made to have the product commercially practical and profitable. The products shown are all such as would bring credit to any school in America. In addition to the equipment acquired from outside, the students have made a turning lathe and a circular saw and this year have been concentrating their efforts on making improved equipment for irrigation purposes. A great deal of irrigation is done from wells by the farmers in that part of China, hence the efforts of the students to try and improve such conditions, stimulated, no doubt, by the recent severe drought which has caused the present great famine in North China. Fig. 9 shows the machine room as it appeared in 1919, with the oil engine installed.

At two other schools in Paotingfu they have inaugurated manual arts instruction, viz., the Chihli Provincial Technical School and the Chihli Higher Normal College. At the former the major course is along textile lines with minor courses in woodwork and metalwork. At the Chihli Higher Normal College they have attempted to train teachers for manual-arts work. It was with this school that the writer accepted a contract in the fall of 1915, when the work was inaugurated, with a class of 44. The equipment of the school was practically nil, but an appropriation of a few hundred dollars was granted with which to get some tools from America.

War conditions prevented the arrival of these tools for many months and work had to be carried on as best it could be until their arrival. This waiting time was occupied with such work as could be done without them or with such as could be made to meet the occasion, such as paper work, clay modeling, drawing, etc. Excellent clay modeling tools were made from bamboo with the aid of knives and rasps. The Chinese use locally-made rasps a great deal for finishing wood. They have a form of knife that is well adapted to paper cutting. See Fig. 10.

FIG. 10 Chinese Paper Cutting Knife

The course in paper work included various cutting and folding exercises, followed by cardboard work. Fig. 11 shows some of the original in cardboard work of the class. As geometrical models were needed for the elementary work in freehand drawing and perspective, such models were made of white cardboard by the students. These were followed by the making of model furniture from cardboard, following the course laid out by the Misses Lathe and Szold. Although it is not always considered good policy to make models, under the circumstances, this proved to be very satisfactory and gave excellent training in constructive ability and initiative. As most of these teachers were to have their work in schools not over that of our grammar schools, this work was specially applicable.

Drawing at the Chihli Higher Normal College.

Freehand and mechanical drawing had been on the curriculum of this school for a number of years but the

instruction consisted in mere copying. Few principles were taught. The Chinese idea of perspective is about like isometric drawing, having no convergence. It was no easy matter to get students to learn and then apply the principles of perspective. After a good drilling in perspective with the geometric models made in the paper course, they were sent out to try the principles on buildings and general outdoor work, instead of copying from drawings and pictures, as had been the custom under the old system. This had a very beneficial effect

The college also purchased a lithograph press and employed a skilled lithographer who took the drawings prepared by the teachers and reproduced them on the stone for the textbooks. The press proved a most valuable adjunct to the work of the school. Besides the drawings for illustrating the manual arts course the other teachers used it for their work with excellent effect. An American teacher was employed as instructor in a normal department of athletics. He found lithography a most useful adjunct in illustrating his subject.

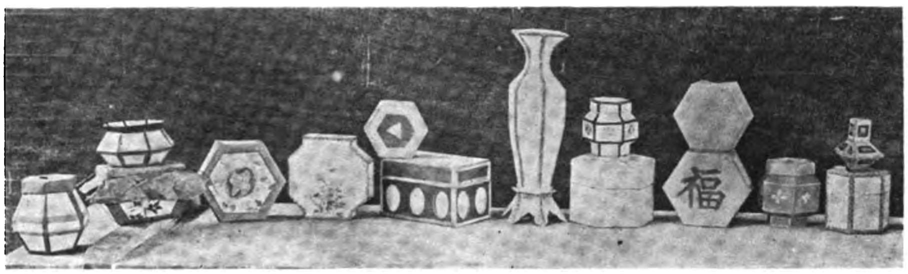


FIG. 11. ORIGINAL PAPER PROJECTS BY STUDENTS OF THE MANUAL ARTS DEPT., CHIHLI HIGHER NORMAL COLLEGE, POATINGFU, CHIHLI, CHINA.

on their work, although occasionally a sketch came in drawn as the object would look from some imaginary point up in the air. A favorite object for sketching was the Martyrs' Memorial, a beautiful stone structure erected, by the Chinese, to the memory of the Christian missionaries of Paotingfu, who were killed in the terrible Boxer Uprising of 1900.

In mechanical drawing, emphasis was laid on the principles of orthographic projection with numerous practical applications. A large glass projection box was made and constantly used, greatly helping to visualize the problems. Both first and third angle projection were taught and they were given problems involving one or the other at random so as to enable them to easily discriminate between the two systems. Metalwork brought in many practicai applications of mechanical drawing.

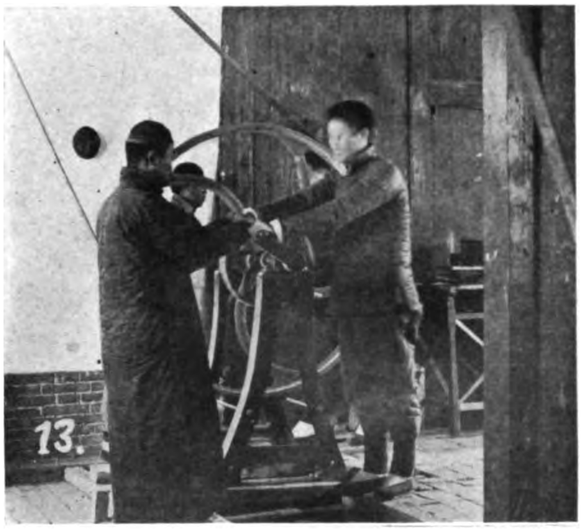
Textbooks by Lithography.

Textbooks on all manual arts subjects, in Chinese, are few and not up to the standard of the best American books. To meet the situation it became necessary to make such textbooks as were wanted as the class needed them. The classes at the Chihli Higher Normal College, contrary to usual present day conditions, were not prepared to take instruction in the English language. It became necessary, therefore, to prepare books in Chinese for their use. Selecting the best features of the best American courses, instruction sheets were prepared in English and given to interpreters who were graduates of the college's English course, who put them into Chinese, written on stencil sheets, from which copies were printed by mimeograph and given to each student. In the first class the English sheets were also mimeographed so that those who had some knowledge of English could compare the two. These notes were printed on strong, thin brown paper and bound with brass binders.

The medical department found it invaluable in the teaching of anatomy. Besides the regular illustrative work of the text, notes, etc., squared paper, isometric projection sheets, music and form sheets of many kinds were made.

In the orthographic projection and descriptive geometry work of the second class, the problems were stated in writing and the students made the drawings on standard-sized sheets of paper printed with light green lines forming one-sixteenth inch squares. Occasionally a few preliminary lines were given from which to work, but the main object sought by this method, in both classes, was to avoid the tendency to copy the solution of the problem if it is presented to the student in the form of a drawing, as in many textbooks. The tendency to copy, by the way, has to be reckoned with in the case of Chinese students. The old system seemed to foster that method, greatly to the detriment of the spirit of initiative and originality. This probably had its origin in the cult of ancestor worship which generated a sentiment that nothing can be better than the ancestors produced or had.

FIG. 12. FURNITURE MADE BY A CLASS OF MANUAL ARTS STUDENTS, CHIHLI, HIGHER NORMAL COLLEGE, PAOTINGFU.



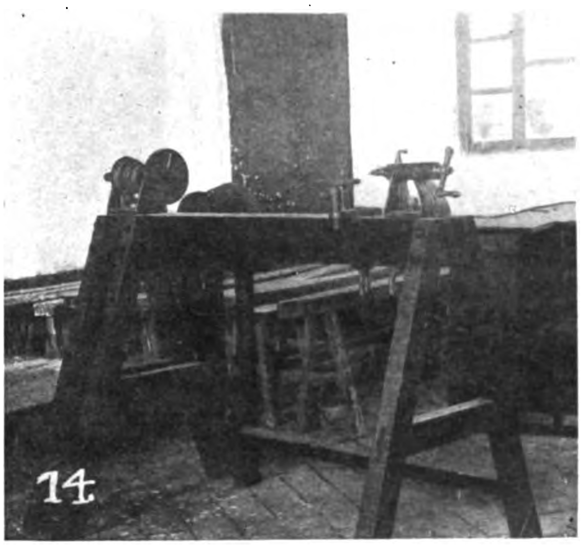


FIG. 13. "FOUR-MAN-POWER ENGINE" FOR DRIVING TWO LATHES, A PLANING MACHINE AND A DRILL PRESS, AT THE CHIHLE HIGHER NORMAL COLLEGE, PAOTINGFU.

FIG. 14. TURNING LATHE MADE BY THE STUDENTS OF THE YU TE MIDDLE SCHOOL AND THE CHIHLI HIGHER NORMAL COLLEGE, PAOTINGFU.

Shop Practice at the Chihli Higher Normal College.

After the arrival of the tools from America and the preliminary exercises in handling them, needing more tools of other kinds not obtained, the class was given exercise in making their own tools, such as squares, bevels, marking gages, planes, straightedges, shrink rules, etc. These also helped in developing the needed initiative and self reliance which are needed so much in the work of these young men who will have to do pioneer work in new fields and where the equipment will be inadequate.

These exercises were followed by cabinet work and furniture. Some of the larger pieces are shown in Fig. 12. The class was divided into nine divisions and each division was given a small general sketch of a piece of furniture which each student of the division drew to as large a scale as practicable and then made detail drawings of each part. Care was taken to show them how to design good joints etc., so that they could design each part understandingly. Thus each student got a good idea of each piece before beginning to make it in the shop.

The lithograph department was a great help in this work. One student in each division made drawings of the pieces for his division and had them lithographed for the whole class. In this way all the class had full sets of drawings of all the exercises. Often the students would take a hand with the lithographer and help put the drawing on the stone thus getting practical experience in lithograph printing as well.

The College did not contemplate including metalwork which requires machinery when the course was started, that being a line with which they were unfamiliar and the value of which they were unaware. After repeated efforts to convince them of the need of machinery, consent was obtained to give machine work a trial. At that time the world war conditions were not favorable for securing machinery from abroad, so the experiment was tried of using machine tools made by Chinese workmen. Two lathes, a planer and a sensitive drill were bought from a shop in Peking where they were made. As the shop had no patterns of a planer of suitable size for the school and there was no time for making a set of drawings, a picture was cut from an advertisement in a mechanical paper and the dimensions specified for the capacity. These were given to the manufacturer and he made the patterns and machine. The workmanship on all these machines was very poor,—in fact, if they had come into an American shop they would have gone directly to the scrap heap. Almost more time was spent in repairing them than in doing the regular work. The lathes were modeled after old European types of tools. As a step bearing for the spindle of the larger of the two lathes, the maker had made an attempt at modernity by installing a ball bearing, using a *tin retainer*.

Permission to purchase an engine for driving these machines could not be obtained, so it became necessary to resort to the Chinese expedient of a hand drive. Fig. 13 shows the "four man-power" engine. This drive, in fact was one that was discarded by the Yu Te Middle School. About one-tenth of a horse-power can be developed by a man for continuous work, provided he does honest work. Such a source of power greatly limits the cuts that can be taken and the amount of work that can be turned out. Fig. 13 shows a corner in the machine room of the Chihli Higher Normal College, at Paotingfu.

The advent of these machines opened an almost undreamed of field of work for the students, most of whom had never seen such machines before. The sight of one piece of steel cutting another was a surprising novelty to them, and set them to thinking along new lines. These machines, which, to Americans, would seem only fit for the scrap heap, seemed wonders to these students. What a revelation to them would be a good American lathe and upright drill set up beside these cruder Chinese attempts at such work! Here is a great oppor-

FIG. 15. CLASS OF SIXTY MANUAL ARTS STUDENTS AT CHIHLI HIGHER NORMAL COLLEGE, PAOTINGFU, CHINA.

tunity for the American manufacturers of machine tools if they would only seize it at this stage of the development of industrial preparation. The recent introduction of some new American tools by the Yu Te Middle School and the Government Technical School, at Paotingfu, has given some of these students a chance to make this comparison.

The introduction of metalworking tools and machines opened the way for pattern making. As woodturning was needed for some of this work, drawings were made by the students of a large foot-power turning lathe. This project also involved some pattern making. Each student made a full set of drawings and most of the patterns of the lathe, thus putting themselves in position for making similar lathes when they get schools of their own. In the design of this lathe it was sought to have as little machine work as possible, so as to meet the probable conditions they would have to contend with. The headstock and other bearings were of babbitt metal and the bed and legs of ash. To give as high speed as possible, a countershaft was made a part of the lathe, enabling a possible drive from a main shaft when available. See Fig. 14.

With the lathes, planer and drill available, they were enabled to make iron body planes and each student of the first class had such a plane completed before graduation and was permitted to take it away with him as a seed for further development of the use of modern and more efficient tools. They also were permitted to take away all the other tools which they made.

The introduction of the metalworking course has opened several new avenues leading to the industrial development of the country. They have learned to make a better equipment of tools than is usual in China and learned how to use them. It has given them a new and better outlook on new work. They have been taught to try and improve the old ways and tools and have acquired a feeling of self reliance that the old methods of teaching did not give. Instead of distrusting new and untried methods they now welcome them. This gets well down to the foundation of the economic regeneration of old China and it is the basis for development of the new republic, on which it must be built. As an evidence of their appreciation of new tools made available to them, this class, just before graduation, sent for several hundred dollars' worth of American tools which they needed for their personal use in their new field of work as teachers of manual arts. They will form new centers of activity and development in the localities where they will be placed in the government's work of establishing manual arts training. Their mental and material equipment may not be quite up to that of the average American teacher starting out on such a career, but it will be a long way ahead of the standards of the past in China. It augurs well for China that such work is being so well encouraged and the present growth is very encouraging.

An elementary course in building construction was given this class so as to enable them to undertake the design and construction of new and better schoolhouses and workshops in their new field of work.

The first class at the Chihli Higher Normal College was given a four-year course and another class was not expected to start until that had finished its work. At the end of two years, however, the Provincial Board of Education organized another class of 119 members to take a two-year course. These were selected by competitive examination of teachers who had had one or two years teaching experience. One from each county was chosen. They were to take up work in primary schools in their respective counties. When this class was wished on the college by the board of education, no preparation had been made for them. An addition had to be hurriedly built onto the workshop to accommodate them. Benches, vises and necessary tools had to be made. Even beds had to be made for them. Drawing instruments of good foreign make for so large a class were not to be had inside of six months, so almost worthless ones of oriental make were bought. At the same time a man had to be employed to keep these drawing tools in repair, they were so poorly made. All workshop tools for the first class were furnished by the college, but the new class was required to pay for many of the tools used. Wooden planes, squares, marking

gages, etc., were made by a carpenter hired by the college. All this caused a delay in getting down to work in the shop for several months.

In addition to this burden, the class could be divided into only two divisions, one of 60 and one of 59. No assistant was allowed and the work had to be carried on through interpreters who had had no experience in manual-arts work. Two interpreters were furnished for this class, one for each division. The first class was supplied with three interpreters a part of the time, each taking a different subject, in which he had to be taught before he could take the work intelligently. This in itself was no small burden. Fig. 15 shows one of the divisions of the second class at shopwork, illustrating the crowded conditions.

This situation was not without its good features, as it gave several months in which to introduce the subject of projection and mechanical drawing, before actual work began in the shop. The students were thus enabled to make many drawings of their shop problems before beginning actual work on them in the shop. Previously it had been impossible to persuade the college authorities of the value of such a course.

(To be Concluded)

Cooperation of the Classroom and the Shop

Margaret Cunningham Ells, Head of Girls' Division, Continuation School, Springfield, Massachusetts

THE assignment sheet was sent from the shop to the classroom as explained in Mr. Twichell's article in the June number of the INDUSTRIAL ARTS MAGAZINE for the purpose of giving the specifications of the job, the kind of material to be used and all other necessary information for the carrying out of the project. Conferences between the shop instructor and the academic instructor were held frequently to determine the practical ways in which to relate up the work. Without such conferences, related work can never be carried out to any great extent by the academic teacher. The specification sheet given the boys to carry back to the classroom, and the one sent the teacher from the shop are valuable, only as they are properly interpreted. The shop teacher cannot carry out the related work alone, neither can the academic teacher do it without help from the shop. It is only by close cooperation between classroom and shop that this work will function. It is well for the academic instructor to visit the shop as often as possible to see the boys at work on the job. In this way much information can be secured that is invaluable.

After a discussion of specification sheets in the classroom, the job was divided into three elements for the purpose of securing costs when computed as follows:

1. **Material.**
   Wood—Southern Pine and Cypress.
   Sheet Metal—Tin Plate.
   Soldering necessary for the job.
   Nails and screws.
   Soap Stones or some substitute.
2. **Labor.**
3. **Overhead or Burden.**

The above scheme of dividing the project into material, labor and overhead gave the boys a skeleton upon which to build in every project, and brought out an innumerable amount of practical questions. For example, a boy doing repair work on bicycles at this time outlined to the class very definitely how he set out to figure the cost of a job. There was much discussion over what he should charge for parts furnished, and the right percentage to charge for overhead. Finally, the boy convinced the class that it was safer to charge a reasonable price and build up bicycle repair work on a fair profit scale. Many other practical questions came up in computing the cost of different jobs. Some of the boys quoted what their fathers thought, and many of them conferred with their father to find out just how a carpenter, painter or sheet metal worker computed costs of jobs. In connection with this work the shop instructor always gave very valuable directions and definite help. Before telling a boy that a sheet metal worker was getting 90 cents per hour, Mr. Twichell investigated conditions, and found out just how much sheet metal workers were receiving in our community at that time. Therefore, the boys had a very definite basis on which to build the cost of a commercial product.

After the general discussion of the project, the class was divided into two groups, the Junior two's doing the wood work, and the Junior three's doing the sheet metal work. As soon as the work had started in the shop, and the boys had received specification sheets and assignments of the different operations, the work was begun in the classroom, the materials to be used by the different groups, duties of the stock record clerk, time clerk, foreman of the job, and the individual worker's duties, were all taken up. The different operations involved, and the boys responsible for the different operations were also discussed.

English—Junior two and three.

In each division, sheet metal and woodwork, short descriptions were given of the individual operation or the duties in the shop. For example, the stock record clerk went before the class and gave a brief description of the project to be made, and outlined his duties in keeping stock records. In like manner, the time clerk, the foreman of the job and the other operators told just what their work consisted of, whether planing, squaring, assembling or whatever their work might be. The foreman of the job in his description brought out the care that should be taken not to waste or spoil materials, especially on account of the increased price of all materials necessary for this project. From these oral descriptions, we were able to secure some good written

descriptive paragraphs, which served as an English exercise. The project as a whole was thereby taken up as classwork, though each individual had his special work.

The material to be used by the Junior three's in making the containers for the fireless cookers was tin or tin plate as we learned later. At once we set about to find out where tin was found and by referring to handbooks and catalogs a very valuable industrial history and geography lesson was developed.

Industrial History and Geography—Junior Three.

We found by referring to a handbook gotten out by the American Sheet and Tin Plate Company that the process of coating iron with tin was invented about four hundred years ago, in the ore mountains of Saxony, where ores of both metals existed. The people in that country kept the process a secret for nearly a century, but after a long and diligent search, English manufacturers, toward the end of the seventeenth century, learned the secret. Later the English discovered the process of rolling iron sheets, and the tin plate industry grew rapidly and for nearly two centuries England maintained supremacy in this industry. In recent years, the United States has become the largest tin plate manufacturing country in the world. The manufacture Pennsylvania. Here the question came up why the of tin plate was first undertaken in 1873 in Ohio and manufacture of tin plate started in these states, and the boys immediately recognized the fact of the wealth of coal and iron ore underlying this section of the country. We were not successful in the manufacture of tin plate in this country at first, because the low duty imposed on foreign tin plate put us out of the market until the Tariff Act of 1890 doubled the duty on foreign tin plate. In this connection, an arithmetic lesson was worked out on customs and duties and tariffs on imported goods.

Other sources of tin were found to be the tin mines of Cornwall, England, and the adjacent islands. In ancient times they were called the "Tin Islands." By referring to the different reference books, the boys found that one thousand years before Christ the Phoenicians sailed from Tyre and Sidon across the Mediterranean Sea venturing as far as the "Tin Islands" and carried tin back to Phoenicia for use in the manufacture of bronze. The tin mines of Cornwall, England, are still being worked, and rank among the oldest in the world. By still further investigation we found that most of the tin used in the United States comes from the Malay Peninsula and the adjacent islands, also from New Zealand and the state of Bolivia in South America. Most of the tin used in the country comes from southeastern Asia and is known as "Straits Tin." Large smelting establishments are operated in Penang, Singapore and Banka.

We had learned from our previous study of iron ore to finished product, that when the crude ore had been fashioned through the different operations into sheet iron, sometimes the sheets were put through baths of sulphuric acid, then water, then muriatic acid, next through a tank of molten zinc, which, when cooled, was called galvanized steel or sheet iron. In like manner the sheet iron was treated and finally put through the bath of molten tin forming the tin plate used for our fireless cookers. Right here in our science work, many experiments were made with the different acids and their effects upon the different ores.

In working out our history and geography lessons, we made use of maps constantly, locating the different places from which tin came, a study of the people working in the tin mines and finally the routes over which the tin came from the Malay Peninsula, Bolivia or New Zealand until it finally reached Pittsburgh, Pennsylvania, the home of so many big smelting establishments. Outline maps of the world were used for this work, and very definite places were given the boys to locate. The question of the important iron mines in Lorraine which Germany had held since 1870 was discussed. From a magazine article one of the boys found that Germany got 21,000,000 tons of iron ore from Lorraine in 1913. Is it any wonder that Germany clung desperately to this vast supply of iron ore? Where does our best ore come from today? We found that the best ore in the world comes from our own state of Minnesota, and even a German from Essen admitted that even though they had furnaces as large as ours, our machinery, our skill and organization, coal as plentiful as ours, *yet they hadn't our ore.*

The next point brought out was the reason why we stand as the leading tin plate manufacturing country of the world. What is tin used for? The boys found by investigation that the food pack of the United States in 1917 required 8,000,000,000 tin cans of various sizes. The various makers of condensed milk used 3,000,000 cases, the salmon pack of the country required 350,000,000 cans, the corn pack used up 286,000,000. Other canned goods such as asparagus, peas, pork and beans, tomatoes, fruits of all kinds, molasses, sardines, etc., required billions of tin cans. The Standard Oil Company, used up still more billions of tons of tin plate, and finally taking the whole population of the globe into consideration, we learned that there was enough tin plate manufactured in this country to give more than three square feet of standing room for every man, woman and child on the face of the globe. None of these figures were committed to memory, but it was an eye-opener to the instructors as well as to the boys to find out how much tin plate was used by Americans.

Going into the history of the tin can we found that Napoleon offered a prize to a man who could invent a method of preserving food for his armies. A Frenchman, named Nicholas Appert, in 1814, conceived the idea of putting food in glass jars. His idea was good but glass was heavy and breakable, and did not lend itself to transportation and rough usage. His invention came too late to avert the tragic retreat from Moscow, and too near the final field of Waterloo to be a

factor in the results. There might have been a different ending to the imperial dreams of Napoleon, and possibly no opportunity for world conquest by Kaiser Wilhelm would have presented itself. The boys were very much alive in working this out and enumerated for the academic instructor the numberless varieties of canned goods which accompanied our army to France and kept it alive. No doubt the recent victory in our world war could not have been accomplished without the aid of the tin can in transporting food. The boys also traced out the work of Robert Peary to the north pole and the service that canned goods must have given him, as well as Lieut. Scott on his journey to the south pole.

The work of tin cans might go on in an endless manner, but a couple of good solid lessons were given on the vast use of tin plate, and we passed over to the composition of tin or tin plate which we found to be in most cases, 98 per cent steel and 2 per cent tin.

Hygiene—Junior Three.

Other uses for tin plate were found in ventilators and from this work a lesson in hygiene developed, showing the necessity for ventilation in all places of industry. Leaflets from the U. S. Government on how to "keep well" emphasized ventilation. Many state laws now require buildings to be so erected that each person will get 30 cubic feet of fresh air, containing 21 per cent oxygen a minute, or eighteen cubic feet per hour. The public now realizes that ventilation is not a luxury but a necessity. Impure air plays a very important part in occupational diseases and the evil effects of insufficient ventilation are especially alarming. By studying this subject of ventilation and referring to good authorities we found that statistics show lack of ventilation in schools is often the direct or indirect cause of tuberculosis. Gulick's health books and magazines as well as publications from the U. S. Public Health Service were used for reference in teaching this subject of ventilation. Emphasis was given to the state law of Massachusetts which states, that a fresh air supply of 30 cubic feet per person per minute is required. In many factories and other buildings tin plate ventilators are used, also galvanized sheet iron ventilators.

Oral and written compositions and reproductions on the subjects taught and discussed were given for classwork. In some cases the boys were asked to give definite sentences about the sources of tin, or sentences asking questions about tin, or whatever point needed to be emphasized for written work in English.

Arithmetic—Junior Three.

The arithmetic in connection with the work on tin plate was very practical. The tin plate came in packages of 52 sheets at a cost of $13. These figures were taken directly from the bill sent to our school. Problems such as finding the cost of one sheet of tin, twelve sheets of tin, etc., were given. The sheets were 20"x28", and we found the surface of one sheet of tin and the surface of various numbers of sheets. Much drill was given right here in necessary fundamentals of which there is always a lack. By going over our plans we estimated that one and one-half sheets of tin plate would be used for each cooker. Twenty-five cookers were to be made, therefore, we would use 37½ sheets of tin. The question came up wether or not we could buy one-half sheet of tin, and the boys decided that we would have to pay or charge 38 sheets to the job. Each sheet cost 25 cents, therefore, the value of tin used was $9.50. Much drill work and many similar problems and examples came out of this. Next came the shape of cover, the question of finding the surface of a circular base, and the cylindrical container, itself. Right here we taught, diameter, radius, circumference, area of circle, surface of cylinder and contents of cylinder. This was very valuable work. The boys worked directly from the circles which had been cut out, and from the cylindrical containers. They actually measured diameter, radius, circumference, etc., and tested their own work. Compasses were used constantly. In other classes a teacher might spend hours developing the surface of the cylinder, but here the cylindrical container was opened out and the boys saw at once that it was purely a rectangle. Instead of spending a great deal of time memorizing rules for area of circle, contents of cylinder, etc., the following handbooks were used for reference: Simond's Guide, American Sheet and Tin Plate Handbook, Millers-Falls tool catalog, Machinists' Handbook, also handbooks and catalogs from the Starrett Tool Company, Brown & Sharpe, Peck, Stow & Wilcox, and many other companies. The more common rules and approximations were learned in connection with this Project, but by investigation the boys found that most men in shops refer to handbooks or decimal equivalents as given on micrometers. Therefore, it seemed advisable to have the boys learn how to find needed rules and measurements.

The woods used for the cases of the fireless cookers was southern pine, also some cypress. Previous to this we had spent much time on the study of pine so a brief review of the varieties of pine, long leaf and short leaf, and which was better for commercial purposes was conducted. In connection with our own native pine we took up the study of the "blister rust" which has become so prevalent and which the different states have been working against. Material for this work was secured from our own state department, and from the U. S. Department of Agriculture. Quite a little work was done on the byproducts of the pine tree, pitch, tar and resin and their uses. In looking up the different kinds of lumber used in our country, we found that 38 per cent of all lumber consumed was southern pine, also that there was an annual production of over 16,000,000 board feet.

Industrial History and Geography—Junior Two.

The work in history and geography was followed out in much the same manner as the work in connection with sheet metal. Maps were used constantly, and sections of the country located from which the pine

comes. Transportation routes, freight rates, bills of lading, car numbers and all other material necessary for tracing a shipment of lumber from the south to Springfield, Mass., was taken up. Much added work was brought out by a study of the "blister rust," and very valuable material was secured from the government for this work. Mr. Twichell, the shop instructor, showed the boys pictures on logging and lumbering, which made the history and geography very vivid. Forests of pine, cypress, etc., were shown and other views of the section of the country from which they came. The great forests of gulf cypress and Louisiana cypress were very interesting to the boys, and the different kinds of saws, methods of hauling logs from the forest and the final finished product of the boards ready for shipment were shown. After the pictures, the boys went back to the classroom and on outline maps located and traced routes of transportation. Much work on the different lines of railroads, the location of definite cities, etc., was done. In addition to this a thorough study of the southern section of our country was taken up. We also worked in some colonial history which the boys needed at this time on brick ovens, warming pans, etc. Different boys went to the science museum and saw the old warming pans and hand stoves used by the early settlers of Springfield.

At this point we spent quite a little time studying the commercial uses of southern pine and were amazed to find that it was used for interior and exterior finish, floors, frame work, siding, sheathing, in heavy construction work for trestles, beams, sleepers, joists, rafters and sills. It is also used for agricultural implements, in machine construction for cranes, dredges, crushers, etc., where the wood must possess strength, toughness and durability, also for boats and during the recent war much was used in ship building. This information was secured from booklets gotten out by the Southern Pine Association, beautifully illustrated, and giving much useful information. Another amazing use of southern pine which the instructor knew nothing about was found to be for wood paving blocks. From this a lesson developed on our own street department.

Community Civics—Junior Two and Three.

When we had learned that southern pine was used for wood paving blocks, the boys immediately began to investigate and found much wood paving in Springfield. We learned also from booklets that Boston was the pioneer city in wood-block paving in the eastern states, the first treated wood-block pavement being laid in 1900 in Tremont Street. New York City took it up in 1902, Baltimore, Md., in 1901, Detroit in 1905 and many other cities were found to be using it. All of these cities were located which impressed a little more geography of the locational kind on the minds of the boys. To be still more authentic we sent to the U. S. Department of Agriculture for a booklet on "Wood Paving in the United States," and found out that Russia used wooden blocks for paving several centuries ago. We found in this booklet comparative values of different pavements, and although creosoted southern pine was more expensive it stood up much better than macadam, brick, asphalt, and was conceded by many to be more desirable than granite or sand stone. In Baltimore, Md., in the summer of 1901, there were laid several adjacent streets of experimental pavements, including sheet asphalt, creosoted wood, and several kinds of brick. After five years' service, and after passing through the great fire, the wood was in better condition than any of the others.

From this wood-block foundation we went on and made a study of our own street department, the boys finding out who was superintendent of streets, his duties, salary, qualifications necessary for such a position, how many miles of paved streets in our own city, certain regulations for taking care of garbage and ashes which few cities undertake, and the necessity for keeping streets clean and attractive. We used the Municipal Register, the City Planning Program and any other current material which gave us up-to-date information on our own street department.

Arithmetic—Junior Two.

The arithmetic work necessary to find the cost of the job was getting the number of board feet used in the construction of cases for the cookers. Boards were brought from the shop right into the classroom, where we measured and planned out, following shop specifications, in order to get the amount used. As a check on this we compared with the record of the stock clerk, and found that our figures were not far from the total number of boards he had given out. The estimated amount used including waste was 300 board feet. The bills for southern pine at this time showed a charge of \$100 per thousand. Right here much drill in percentage was given in comparing the cost of Southern Pine with Whitewood which was formerly used in nearly all our shops. During the war, however, the price of whitewood went up from \$40 per thousand to nearly \$150 per thousand. In this way the boys computed the percentage of increase in costs, and also why it was cheaper to use southern pine at present rather than whitewood. Old bills were referred to for this work and pre-war prices were used to show the percentage of increase not only in lumber, but in all other shop materials, such as nails, screws and all kinds of tools.

Three hundred board feet of southern pine was used at a cost of ten cents per foot, 25 feet of cypress at a cost of twelve cents per foot, bringing the total cost of lumber up to \$33. To find the number of nails to a pound, the shop instructor referred us to the Simond's Guide where we found five penny nails, length 1¾ inches, of common wire, came 270 to a pound. In like manner we estimated the number of screws used, took up the number in a gross, how many gross used and finally checked up with our stock record clerk where we found that the nails and screws for the job amounted to approximately \$1.50.

A final summary sheet was made from time cards on the cost of labor for both sheet metal work and woodwork, taking into consideration that a carpenter or sheet metal worker would demand about 90 cents per hour at this time. This is a very necessary factor in showing the boys the commercial value of an article. Next came the cost of shellac and varnish used which was estimated to be about $2.50. Right here we worked from our bill again finding out how much shellac cost per gallon and again referring to hand books found out how much varnish was needed per square foot for a first coat, second coat, etc. The asbestos used formed a very small item; much valuable work on the reasons for using asbestos, where mined and the different ways in which asbestos is used in industry. Several samples of asbestos roofing was secured from a firm in Ambler, Penn., and the very common use of asbestos in curtains in theaters was brought out.

Community Civics—Junior Two and Three.

Following the use of asbestos, the work of the fire department, fire prevention, and protection was taken up. Much arithmetic was worked out in connection with fire losses, comparisons being made on per capita losses in this country, France, Germany, Holland and Belgium. (See Every Day Arithmetic). The fire losses per person in this country were found to be much greater than in the foreign countries, and in this connection much time was spent on fire prevention. Then a very definite study of our own Springfield fire department was made, and in this as in our study of our street department we followed the excellent plan mapped out by Dr. Jessie M. Law, supervisor of community civics in Springfield, Massachusetts.

English—Junior Two.

Oral and written descriptions, and some narration, much reading from magazines and all sorts of reference books was continued during the study of this project. Some excellent papers were passed in, some of the boys sketching the old fashioned fireplace and brick oven, and writing up the story of the evolution of methods since colonial days. Spelling words used in the construction of the cookers, all necessary trade words, important cities from which materials came, states, etc., were all used for drill work in spelling. Oral grammar work was not neglected and sentences like the following were used for drill work:

Izzy and (I, me) did the planing.
(Who, whom) is the foreman of the job?
It was (I, me) who kept the time.
(We, us) boys did the squaring.
Mr. Twichell told (he, him) to get out the stock.
He would not (accept, except) my figures.
The work was done (well, good).
He (did, done) the finishing.
I (saw, seen) the mistake.
Please (leave, let) me go to the shop.

A final summary sheet was then made up by each boy setting forth the costs of the different materials, labor and overhead. From this we arrived at an approximate cost of three dollars for each fireless cooker. The summary sheets were found to be very valuable as they left a very businesslike impression on the boys. It brought out the idea of the whole project, and trained them in businesslike methods of finishing up a definite piece of work.

In connection with every job, we tried to give the boys an ideal. Stories of how John Wanamaker, Andrew Carnegie, Charles Schwab and Stephen Girard had made good were an inspiration to them. We found them reading lives of many great men who had started out in life as poor boys. All sorts of magazines were used for this work, and the library consulted as well. We found it a very stimulating thing to boys without ambition to show them the hardships which had beset many a man, but who finally, through hard work,

PRACTICAL ARTS DEPARTMENT.
Central St. Jr. High School,
Springfield, Mass.
Woodshop.

Class J—II and III. **Job. No. 48.**
Date April 15, 1920. **Project—25 Fireless Cookers.**

Assignment Sheet for Teachers.

The boys in this class have started the cases for the 25 fireless cookers. Metal parts to be made by J—III.

As the job progresses, data for various sorts of related work in all subjects will be furnished to suit the needs of the academic class.

The stock for this job is ½ inch clear pine bought from a firm in the South, and shipped with lumber for the vocational school.

For working drawings and specifications see Shop Job Card No. 48 which may be used in classroom.

Suggestions for related lessons.

ENGLISH:

1. Have boy write office for information as to prices, location of sources, transportation, etc.
2. Write specifications as to construction (see boy's assignment).
3. Composition—

See boys' sheet for topics.

a. Description: Tools, Jigs, Cooker, etc.
b. Exposition: Various processes used in shop.
c. Narration: Incidents in the day's work in shop. Imaginative stories of lumber camp based upon lantern slide pictures shown to class. Spelling lists of trade words as well as others suggested by the entire procedure.

MATHEMATICS:

1. Compute all time and shop records for drill in processes.
2. Review board feet by making estimate of the cost of stock.
3. Find actual cost from amount of timber used. (See stock clerk's reports.)
4. Add fifteen per cent for "overhead" and 20 per cent profit, then find price at which we may sell these cookers.
5. Special operations will be provided as classroom teacher may indicate.

HISTORY:

Evolution of cooking methods and whatever contemporary history can be taught at this time. Colonial history—customs of colonial times; brick ovens, husking bees, house raisings, quilting parties, etc.

GEOGRAPHY:

This subject can here be tied up with history as the development proceeds.

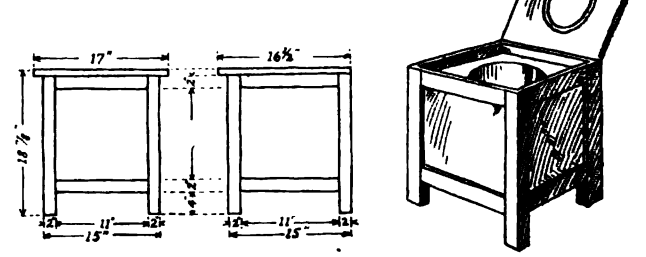
Transportation maps will work in here. (The Government maps on Forestry will be found useful.)

SCIENCE:

Subject of heat and insulation will be taken up and taught in shop as well as the relation of moisture to expansion and contraction.

REMARKS:

Details not clear to the academic teacher will be explained from time to time. As the project progresses, assignment sheets will be sent giving suggestions for Related Work in Sheet Metal (Tin) and Asbestos.



DETAILS AND SKETCH OF FIRELESS COOKER.

honesty and courage, had arrived at a place of responsibility. Abraham Lincoln said, "I'll study and perhaps my chance will come," and it did come, as it will come to every American boy who has the "stuff" in him to persevere, as did the great martyred president.

As there is some poetry or music in every human soul, so these boys working out a project of 25 fireless cookers loved poetry and music. After a hard period of work in the shop, when the boys had washed and returned to the classroom, occasionally time was taken for some good "sings." Much enjoyment was also gotten out of such poems as "Clang of the Forge," "Ship of State," "Old Ironsides," "Captain, Oh My Captain," "Flanders Fields" and "America's Answer," also Robert Service's "Rimes of a Red Cross Man." Many of the last mentioned poems were memorizel by the boys, also "Flanders Fields" and "America's Answer," and I am sure that these masterpieces which came from the world war are just as much imbedded in the souls of our boys as were the old Civil War poems in the school boys of fifty years ago. These boys have a right to be taught how to spend their leisure time, therefore, the more we can make them love good books, good music and poetry, the better citizens we will have in our community. I never meet a boy who has been a former pupil of mine and gone on with the ambition which we planned and tried to give him in school, but what I feel, as he recounts his success in life, an honest pride in the work done for the individual, the community and the state.

STUDYING THE COOKER IN CLASS.

TEACHING FIFTH GRADE WOODWORK. III.

THE WAGON

Fred L. Curran, Supervisor of Practice Teaching, Stout Institute, Menomonie, Wisconsin

THE small farm wagon is successful in fifth and sixth-grade classes. By the use of the wheel cutter which was described and shown in the February number the wheels can be cut quite easily from 3/8" basswood or pine lumber, and the success of the project depends quite largely on how well and how easily the wheels can be made. The wheels are fastened to the axles with round head blued screws (Size 1½-14) and washers are placed both outside and inside of the wheels.

The wagon as a project may be considered complete when made with box as shown in upper drawing, but further interest is developed if a stock rack, hay rack, and seat are made to fit the box. The illustrations show the wagons complete with stock and hay racks. Some of the faster workers may make three or four types of racks while the slower ones will be able to make but one or two.

Order of Procedure.

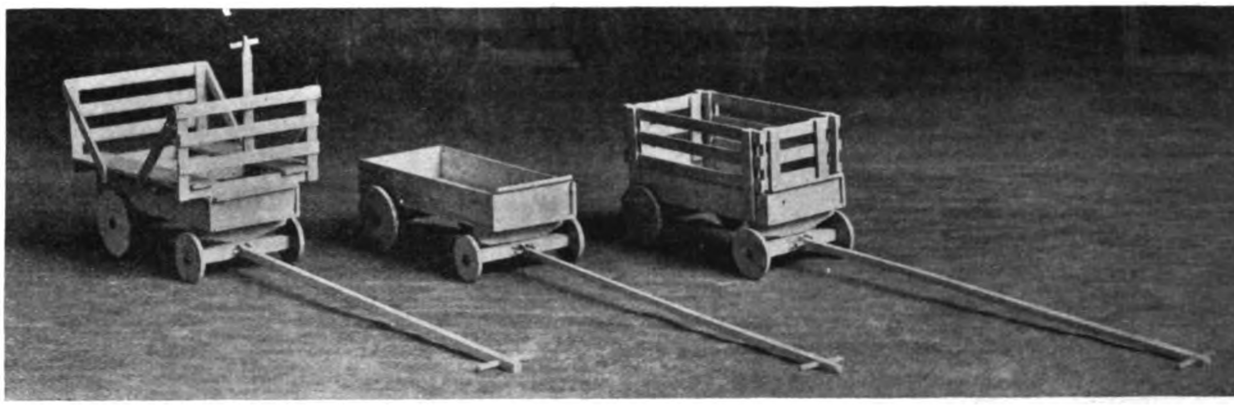
The box is usually made first. The axles are then made and they are fastened to the box by driving nails or brads through the box into the axles. These nails or brads should be about one inch long and should be driven at an angle to prevent the axle from working loose. The movable part of the front axle is fastened to the stationary part with a round head screw. A washer is placed between the two parts to enable the lower part to turn freely. The wheels are next made and attached to the axles. Care should be taken in locating screws so wheels will all touch the floor when assembled. The tongue is made last and fastened to the axle with strips of tin or iron.

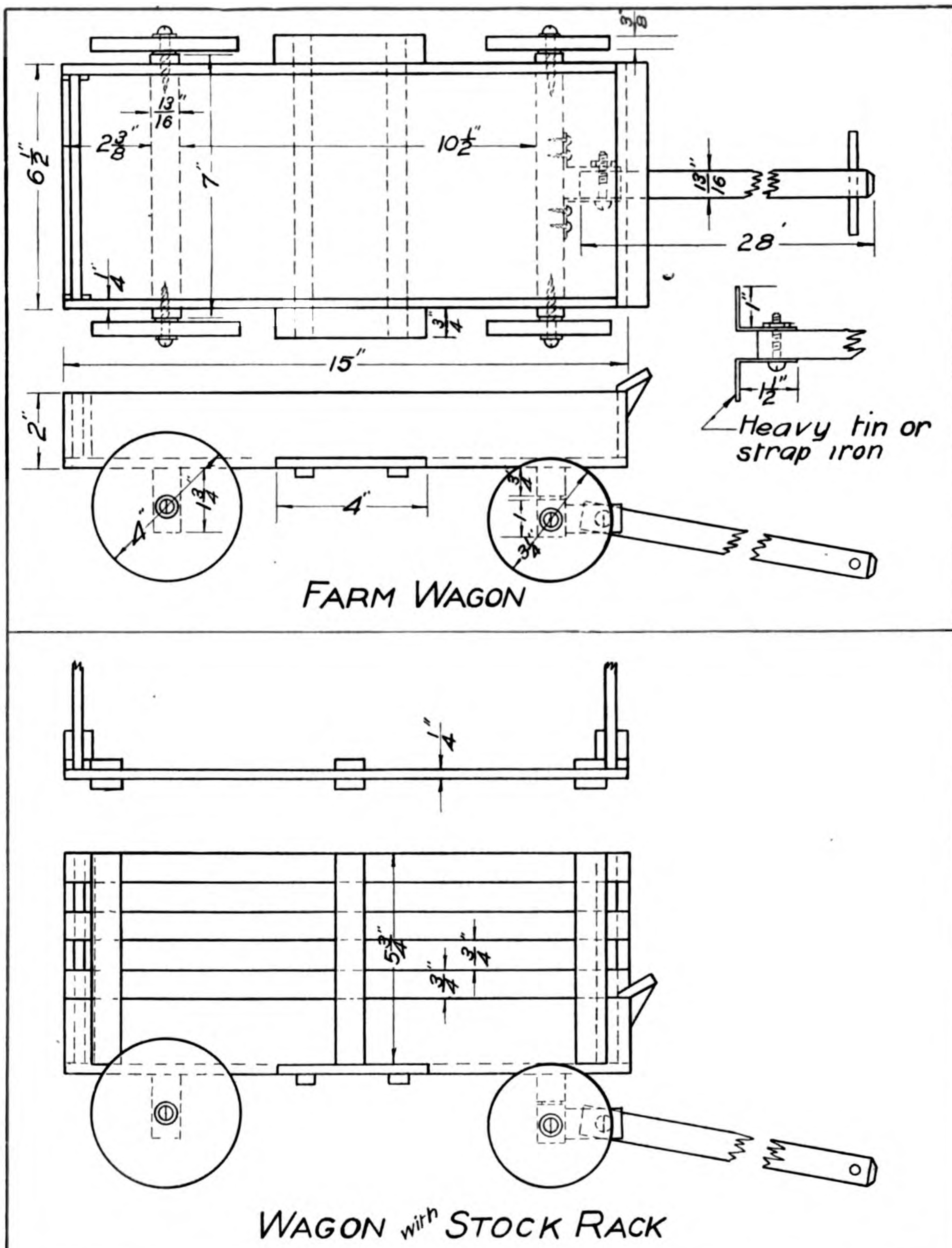
System in Handling Materials.

One of the most difficult problems in teaching woodwork in fifth grades is the handling of materials economically as to time and cost. First of all each boy must have some place to put his unfinished work and materials at the end of the work period. This may be a drawer or cabinet or even a box, but whatever it is each boy must be made to feel that he is responsible for taking care of his work. The duty of the teacher is to see that each boy's work is safe from one work period to the next. In order that the work run smoothly such small materials as brads, nails, screws and washers should be issued to boys in small individual boxes which they may keep in their cabinets or boxes. At intervals of one or two weeks each boy should submit his box or cabinet for inspection. At this time all unused materials should be returned to the regular stock and supply cabinet.

Caring for Tools.

Fifth-grade boys are interested in the finishing of their projects but they must also be made conscious of the necessity of taking care of the tools which they use. It is just as much a part of their education to develop a real desire to take care of the tools in the shop as it is to do the construction work. The first step in this di-




6 1/2"
13/16"
2 3/8"
10 1/2"
7"
1/4
3/8"
3/4
13/16"
28'
15"
1"
1/2"
Heavy tin or strap iron
2"
4"
1 3/4
4"
1 3/4
3/4
FARM WAGON
1/4"
5 3/4"
3/4"
3/4"
WAGON with STOCK RACK

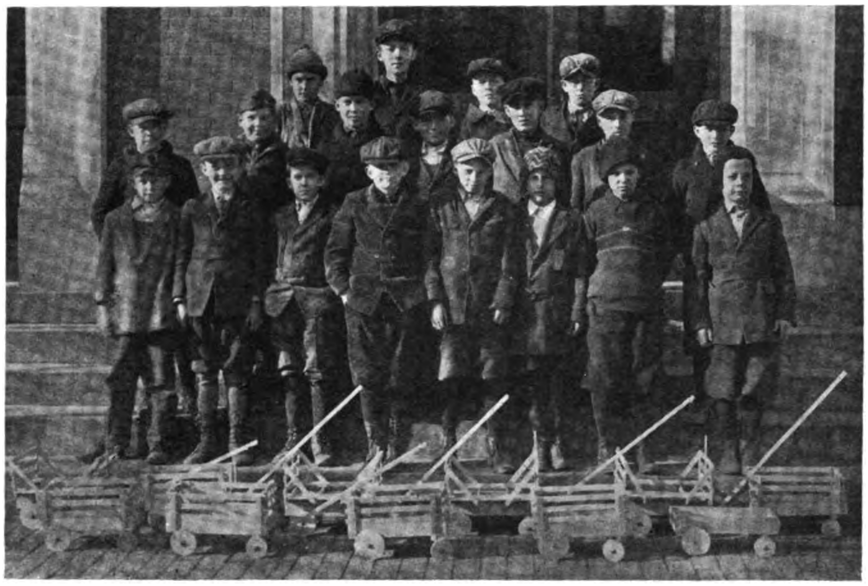


FIG. 2. THE CLASS AND THE WAGONS IT MADE.

rection is for the teacher to have a definite place for each tool, and second, to see that each boy learns where each tool belongs, and third, to see that each boy puts the tool in its place when he is through using it. Teachers can well afford to spend considerable effort at the beginning of the year in getting right habits formed by the boys as they start using tools and materials. A few habits carefully developed at the beginning will prevent much confusion, restlessness, dissatisfaction, and poor work later in the year.

THE CASE AGAINST THE MUSSY LINE

Edwin M. Love, Alhambra, California

"YOUR lines are mussy!" Expressed in words, this is undoubtedly the first criticism that an architect has to make on the work of student draftsmen who come to his office for practical experience during the summer vacations. This is a criticism of the fundamentals of drafting technic, and therefore a reflection on the school drafting classes and their instructors.

No discussion of the merits of the case is necessary. Any casual glance at school exhibitions of drafting confirms the justice of the criticism. Especially is this true of pencil drawings, which usually are characterized by weak, ragged lines and faulty intersections or corners. Such plates may be scrupulously clean and well balanced in arrangement, but the irregular lines more than offset the good points. More often than not they express a fatal deficiency in the ground work that ought to be given to every beginner.

It is in the manual training room of the grade school that the average drafting student receives his first lessons in drafting. Here he learns to express in plain figures the three-dimensional box or taboret that he is to build in the shop. Through the medium of the drafting board he begins to sense the practical value of arithmetic and the usefulness of graphic solutions of problems. But because the allotted time for shopwork is small, and the extent of its compass and purpose large, drawing is as a rule confined to a few minutes of time literally stolen from the precious shop period. Too often the boys consider it an unnecessary evil and hurry through their drawings in a slipshod manner, while the busy teacher gives such slight individual instruction as he can.

Under such conditions high ideals can not be attained. But vast improvement in the average work turned out by beginners can be made by giving a little time to the specific problem of "snappy" drawing. Seventh and eighth grade boys are quick to improve when shown what methods will bring the improvement, while even fifth grade boys can be expected to develop reasonably firm lines. Most boys readily see the difference between a poor drawing plate and a good one, though frequently they cannot tell where the difference lies, or what steps should be taken to remedy the defects of the inferior drawing.

Evidently lines do not of themselves interest boys enough to warrant their being used for their own sake as preliminary exercises in drafting. But when such proficiency in composition has been attained that students can draw simple plans with a fair degree of accuracy in the laying out, it is high time to begin the propaganda of neat delineation. At this time make a collection of the best plates and encourage the class to discuss them frankly. When in the course of the discussion the importance of firm lines has been brought out, the question of how to make them should be raised.

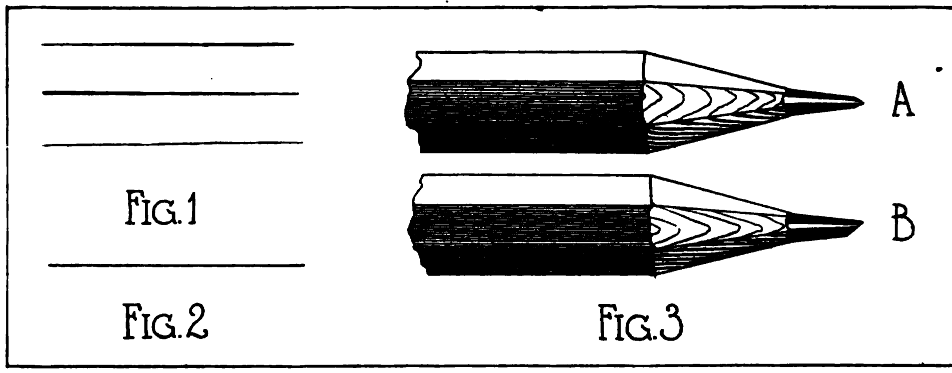


FIG. 1 FIG. 2 FIG. 3

Ask one of the boys to draw a line. It will probably be similar to one of the three shown in Fig. 1. By questioning the other students its faults can be quickly found. One will say, "It's thicker in the middle than it is at the ends"; another will mention a quaver or quirk, and someone else will likely think that it doesn't seem to start or stop at any particular place.

Having isolated these faults, the boys can appreciate the crisp, clear definition exhibited by a line drawn by the teacher or one of the progressive boys who has "caught the trick." Fig. 2 illustrates such a line. If now all the students draw a line, considerable improvement will be noted, though the dull pencil point and the uneven wearing of the lead will count heavily against the looks.

The mechanics of the drawing of a line is the next consideration. No dull pencil points should be tolerated; it is a simple matter for each boy to keep a piece of fine sandpaper near for touching up his pencil. A long, conical point is unquestionably the best for students, as it is the usual preference of the professional draftsman. To draw the line, place the point firmly on the paper; rotate it slightly, if necessary, to make a positive start, and with a firm, even pressure, together with a continuous rotary motion of the pencil, move along the straightedge to the end, where a sufficient pause is made to give proper definition, and lift the point. The rotating of the pencil causes the point to wear as in A, Fig. 3, preserving a point at the center, rather than wearing a flat on the side, as in B, Fig. 3, which would result in the line being wider at the end than at the beginning.

After a few lessons in which line drawing is stressed, a study of drawing corners may be taken up. Just as the average student draws ragged lines, he forms corners with little regard to the simple elements that govern their construction. If a reading glass or other lens is available, the boys can readily see why the corners that they draw lack the something that should make them crisp and firm. Under the lens these corners appear as shown in A, Fig. 4. The ends of the lines are semi-circular in outline. Either they merely come close together, leaving a gap between, or their curves are tangent and show a reverse angle at the outer edge. How different the result when the lines are slightly crossed, as in B, Fig. 4. There is no question here about the angle being sharp, even when magnified. The ends of the lines are beyond the intersection, leaving the crisp, straight edges of the line to form the angle.

After all, the most difficult problems frequently hinge on simple propositions. The mussy line can be largely eliminated by the use of these two little lessons and occasional judicious reminders whenever the students become careless.

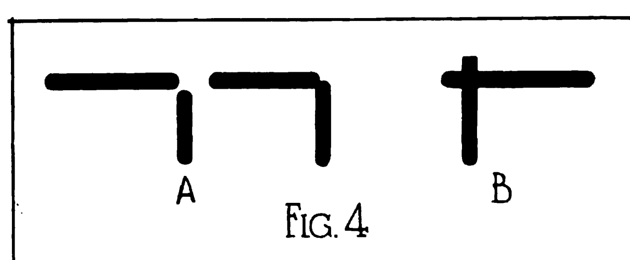


FIG. 4

HAND CARVED PICTURE FRAMES

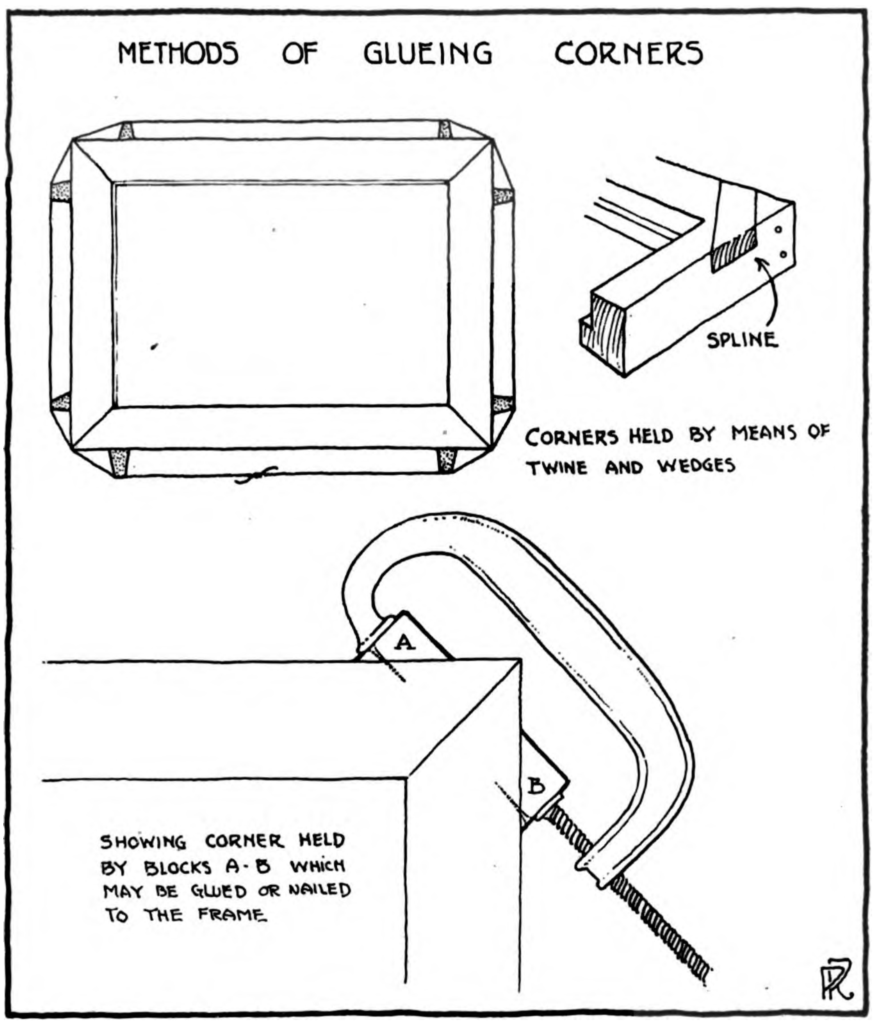
Charles H. Richert and Otis Philbrick, Rindge Technical School, Cambridge, Mass.

THE horrible examples in picture framing may be divided into three classes. Perhaps the most atrocious class is the over-ornate one with deeply carved floral embellishments of all sorts which prevent one from looking at the picture within it. Next comes our old familiar friend, the pride and standby of the carpentry shop—the frame made of natural oak or other highly grained wood—made by a man who loves the grain in wood and cannot resist the temptation to bring it out in great curly waves across the width of the frame. What picture if properly harmonious and pleasing could compete with this? And last but not least offensive is the frame painted with a cheap, cheap coat of bright, bright glittering bronze and left untoned so that the picture, if one can see it at all looks exceedingly dark and gloomy.

The fault with these frames lies in the fact that each in its particular way clamors for notice and attention whereas a good frame is unobtrusive and subservient to the picture within it.

It is the purpose of this article to describe clearly and concisely the designing, carving and finishing of a few simple artistic picture frames.

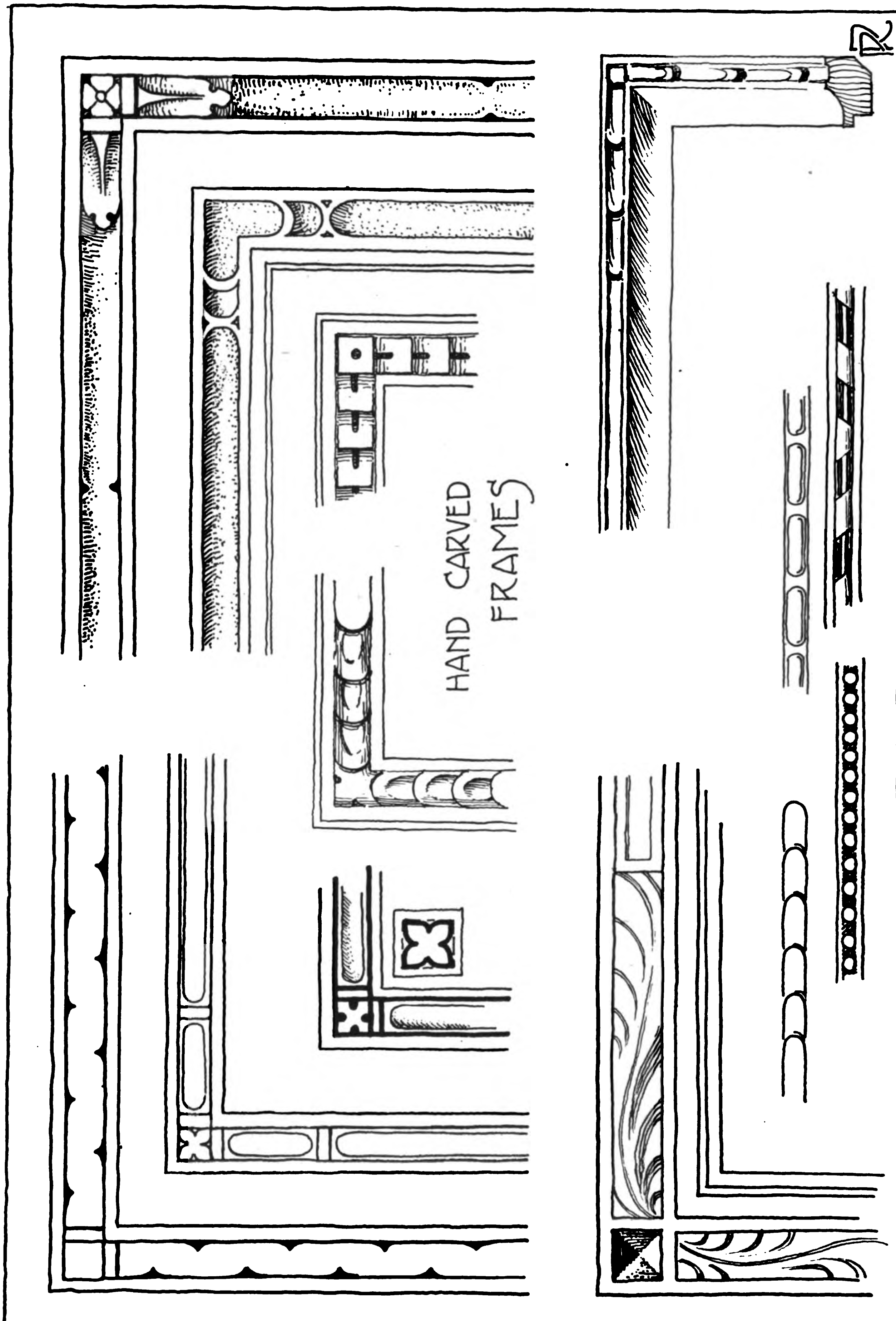
The first consideration is the kind of wood from which the frame is to be made. Clear straight-grained pine is a joy to carve—poor pine is an abomination. Oak is harder to work and requires exceedingly sharp tools. White wood answers all requirements satisfactorily. The wood of course must be rabbeted on the inner edge to allow for glass, etc., before being joined.



CONSTRUCTION OF CORNERS AND METHODS OF GLUING.

To mitre and glue the four corners of a frame accurately and permanently calls for considerable nicety and ingenuity. It takes both glue and nails to hold the corners properly; even then if the frame has much width, it will have a natural tendency to crack open on the inside of corners.

The drawings show two methods of holding the corners together while gluing. The clamps are best for very large frames and anything over 25″ x 30″ but the


HAND CARVED FRAMES

arrangement of string and small wooden wedges shown is very ingenious and efficient. Glue the corners and place the pieces in position, tie the string around the frame and arrange the wedges. The two small wooden wedges are placed together in the center of each side and pushed one toward each corner to tighten. If more than one frame is to be made it will be found worth while to take the time to make a small groove with a gouge over the top of each wooden wedge where the string passes over. This keeps the string from slipping off while tightening. Before putting the corners together give them a thin coat of glue and allow to dry for a few minutes. When the final coating of glue is put over this it will stay there, hold the corners together and will not be absorbed into the wood.

Do not depend upon glue alone; nail the frame securely and set the nails. After the glue has dried for 24 hours it can be easily nailed by holding in a wooden vise the side into which you are nailing.

The frame is now ready for carving, the design for which should be worked out on paper full size and traced. Several designs are shown. They can be varied and adapted in a great many different ways. Keep the designs simple. The shapes used need not look like or suggest anything—the whole purpose is to make a pleasing pattern. Do not try to make the frame into a picture—the picture goes into the frame. The corners can stand more elaboration than the sides.

Do not think it necessary that because the picture contains *boats* the frame should be carved into shapes resembling crabshells and other things marine, or if *horses* it should be framed with a pattern of horseshoes, or if a hunting picture it should have a frame made of actual feet of plover and snipe intertwined and varnished to surround it. This is not exaggeration. These things exist. Do not think that the frame need have anything in common with the picture as far as sentiment or motive is concerned.

But it should have everything in common with the picture so far as tone, color and proportions are concerned. To hold the picture and glass together—to cut the picture away from its surroundings in a pleasing and not too abrupt manner and not intrude upon the onlooker's vision—that is the purpose of a picture frame.

All this should be considered in designing a picture frame.

It is decidedly worth while to glue together a corner out of the pieces left over after cutting the mitres, upon which to practice carving a corner design. Do not carve the design too deeply and avoid having too many different depths.

Simple beads running lengthwise—careful attention to the proportions of the width of the frame—and a little elaboration in the corners—that is the recipe upon which many a good frame can be designed. Study good frames after you are able to recognize them. They will help in designing your own. Historic ornament contains a wealth of material for this purpose if judiciously used. After the frame is carved it may be treated in several different ways. For a quick, simple result the frame may be sandpapered, shellaced and bronzed. Do not sandpaper too much or the carving will lose its character. Orange shellac is better than white as it gives a better undertone for the gold. Still better mix some dry burnt sienna with the shellac and coat the wood with it; two or three coats will do no harm. This gives a very sympathetic ground upon which to bronze, very much like the red gold size upon which gold leaf is laid.

Again the raw frame may be treated to several coats of a mixture of thin glue made of parchment shavings mixed with gilder's bolted whitening. The mixture should have the consistency of heavy cream and feel slightly sticky. It should be painted on luke warm with a brush and allowed to dry. Go over it lightly with fine sandpaper and coat again. Add sufficient coatings to reduce the harshness of the carving to the desired degree. This method gives a subtlety and delicacy of modeling that can be obtained in no other way. A frame resembling beaten gold is made by laying gold leaf upon the same preparation.

In bronzing if the frame is to be toned after bronzing select a bright, light gold bronzing powder. If not to be toned use a rather low-toned bronze. Use the best bronze powder—the cheap grades will have a mealy look when put on that is disagreeable. The surface upon which the bronze is to be put should be smooth and coated with glue or shellac, otherwise the medium with which the bronze is mixed will be absorbed into the wood leaving the powdered bronze to rub off easily.

The final flavor of a picture frame is imparted by means of toning. Toning is the process by which a frame is brought into harmony with the picture. This is done by putting into the frame some color which gives a hint of the predominating color in the picture. This is not difficult to do and makes a world of difference. Use oil paint mixed with turpentine or gasoline so that it will dry in flat and not look shiny. Mix the proper color and paint it all over the frame and with a clean dry rag wipe it off carefully. High places in the carving will be wiped entirely free of paint while the low places will retain it.

This treatment gives the frame a very considerable degree of refinement, the advantage of which will be fully appreciated by anyone who has applied or seen it applied. Of course the color chosen for toning is of great importance. Keep the colors quieter than the colors in the picture. It is very easy and tempting to overstep the bounds of good tatste in this matter. There are many frames offered for sale in the shops which have been toned in the manner described but which might be criticized for the relations between the colors in the picture and frame. Perhaps the most striking and unfortunate examples are the ones in which an attempt has been made to repeat the colors in a Maxfield Parrish picture in the frame around it. The blue for

instance, that exquisite quality of blue or blue green or blue purple in sky or sea over which Mr. Parrish has probably slaved almost with "fasting and prayer," has been killed by a garish vivid more powerful but very ordinary blue in the frame.

One of the most important qualities which go to make up good taste and refinement in art is the power to resist the influence which vivid color exercises over so many of us.

THE PUBLIC SCHOOL PLACEMENT BUREAU

F. M. Trumbull, Dept. Vocational Guidance and Placement, Rockford, Ill.

The problem of organizing human labor resources has emerged, like many other social and economic problems, from the realm of academic discussion into that of practical action and tangible results. Having sensed the need we have sought for ways and means of so organizing our labor resources that society may have the benefit of the best and most efficient service the individual may render and that the individual may receive the highest possible return for his service and get the greatest possible enjoyment in that service. The vocational guidance movement and the school placement bureau have grown out of our effort to accomplish these aims.

The school is assuming great responsibility for the preparation of satisfied and satisfactory employes. To that end guidance is being provided so that boys and girls may make a rational and wise choice in selecting their vocations. Elementary school courses are being broadened and enriched enabling children to find and develop their interests and capacities. High school courses are being broadened and enriched enabling them to test and to follow up those interests and capacities with special training preparing either for further study or preparing directly for entering an occupation in accord with those interests and capacities.

The old narrow academic high school course of a few years ago which was essentially a classical-college preparatory course and which was taken advantage of by only a very small percentage of boys and girls has given way to elective curricula which include along with classical and other college preparatory courses, courses which offer definite vocational training which carries immediate, available value for entering and making progress in an occupation. Coincident with this broadening and enriching of elementary and high school courses the attendance of pupils in high schools has during the past twenty years increased six times as fast as our population has increased.

With these larger opportunities for training available in the public schools, boys and girls in their early youth can not afford to leave school to go to work except in cases of extreme necessity. Their time and effort if given to industry during this period in their lives brings only a minimum return. It becomes a major function of vocational guidance to lead these boys and girls to appreciate and to take advantage of the opportunity that school offers for making a preparation that will enable them to enter their chosen occupation at a higher level or to more speedily attain the higher levels if not to enter upon them directly.

After the vocational guidance department has aided a pupil in choosing a vocation and has influenced him to make the best possible use of his school opportunities in preparing for that vocation, there still remains a very definite obligation to be fulfilled. When the time comes for the pupil to leave school an obligation rests upon the vocational guidance department to aid that pupil to enter the world's service at a point where he can render the most efficient service. Furthermore there remains the obligation to follow up that pupil after he goes to work and in every practicable way aid him to make progress in his vocation.

In the discharge of these obligations the vocational guidance department must establish a placement bureau. This bureau becomes in effect a sales agency for the product of the schools. In order to efficiently function as a sales agency it must know its goods and in that it does not send its applicants as average boys or average girls to average jobs but as individuals selected to fill individual positions.

Individual differences resulting in varying interests, aptitudes, capacities, and attainments require that the bureau have at its command specific and detailed information regarding each boy and girl that may come before it for assistance. On the other hand the placement official must have a wide general knowledge of the various industrial and commercial occupations carried on in his community and must get into intimate personal acquaintance with employment managers. Before referring children he must know very definitely just what are the specific requirements for each particular job for which an applicant is sought.

The gathering of specific information regarding boys and girls can be accomplished by cooperation of teachers and school counselors with the central office. The counselor should be responsible for a cumulative system of record cards which will give a relevant history of the individual pupil from the time he first enters school. This record should be built up from teachers' reports and estimates of academic ability, physical and health records, nurses and physicians reports, general intelligence tests, special tests, and reports that indicate any special interests or aptitudes that may be revealed at any point in the pupils' school work or outside activi-

ties. Counselors should visit homes to discover environmental influences. As the pupil enters high school and at intervals of perhaps two years thereafter questionnaires should be filed including answers to questions that will bring out the pupil's self analysis and developing interests.

All this information should be brought to the central office when the pupil comes seeking placement. If possible his school counselor should accompany him to join in conference with the placement official. Issuance of work permits to pupils under sixteen years of age should be handled by the placement official, the applications coming through recommendation of the counselor.

The workers that come to the school placement official for assistance include "after school and Saturday" workers, "part-time continuation school" workers, "vacation" workers, those leaving school to become full time workers, and those of any of these classes that may seek replacement after having lost or left their jobs for various reasons. In these groups are youths of every degree of intelligence and ability, some with executive and inventive abilities or capacities, others with average intelligence but lacking initiative, and others of low grade capacity. When an applicant comes before the placement official for an interview, with the help of the records which indicate his abilities, aptitudes and ambitions, whether certain potentialities be present, whether he be generally intelligent and efficient or whether he will probably never be so, that official must analyze the applicants vocational needs and capacities. With the help of the most complete data available this interview still calls for unusual skill and a wide experience if it is to be profitable and real assistance is to be rendered. The skillful official will secure the confidence of the applicant, will be able to make him feel at ease, and free from selfconsciousness, so that he will talk freely of himself, his interests, and his intentions. Even if the official should decide that the applicant should go back to school, or back to his job if he is simply dissatisfied without sufficient reason, that advice must be handled with discretion. No advice can be effective unless it becomes the result of the applicant's own judgment based on facts brought out in the interview.

After the official has drawn his conclusions regarding an applicant and has decided that he deserves placement or replacement as the case may be, he must next consider the market open for the service offered. At this point efficiency on the part of the official will depend upon his wide knowledge of occupations and his intimacy with local employment conditions and the extent of cooperation he has secured with employment managers.

The securing of this cooperation is a big field of work in itself. It calls for the finest skill and conservative judgment on the part of the official making and maintaining contacts with employers. Interviews with employers are as crucial as interviews with applicants. A personal interview with an employer offers opportunity to find out specific information as to necessary qualifications for workers in particular jobs or classes of work, conditions under which they must work, and opportunity for advancement. It gives an opportunity to study the personality of the employer to determine whether he may be a fit person to supervise young workers. In these interviews it is important that all possible relevant information be secured during the first interview. Later calls to fill in facts which might have been secured at first are an annoyance to business men and should be avoided if possible. Tact and judgment, though very intangible qualities, are very necessary in seeking information from business men. No one person can tell another how to conduct an interview and how much information to get. A good placement official will get what he wants, perhaps all in the first interview, if not, in later calls.

The question of wage or salary is a very important matter of information and one concerning which employers are sometimes inclined to be reticent. The salary offered may depend on the type of applicant accepted and his special qualifications. Whether or not a definite wage or salary is quoted, the placement official should get sufficient information to have a definite idea of what the position will probably be worth.

Inquiries which belong to factory inspection rather than to job analysis must be handled with care. The official may be told or may be shown working conditions which are far from ideal. He must keep in mind the fact that all establishments grow old and cease to be entirely satisfactory long before it becomes justifiable to condemn them. Some of our public school buildings are as bad or worse than some business houses that the public would be inclined to condemn. However, our boys and girls must be guarded. If there be good reason based on fact, not on sentiment, why an employer should not be sent the junior help he seeks, the facts should be stated frankly and the positions filled with older persons if possible.

Contacts with employers reveal to them the placement officials ability to grasp and deal intelligently with employment problems, and create a favorable impression of his work and of the official as a public servant. This confidence must be maintained and reinforced by the quality of service rendered by the boys and girls who are placed. This in turn depends upon the discretion exercised in referring children. The various phases of work carried on by the bureau are necessarily all interdependent.

In addition to the problem of finding employment for boys and girls that is educational and disciplinary rather than demoralizing, and the problem of fitting the right boys or girls into the right jobs so that they become satisfactory and satisfied employes, the placement bureau in working out these problems finds itself obligated to develop a method of supervising these boys and

girls after they have been placed. This becomes necessary in order to ascertain whether the job proves suitable on the one hand and on the other to see that the worker renders satisfactory service and receives deserved promotions. To watch and to aid these boys and girls in making progress after placement is just as important as finding the jobs.

For them to have contact with a competent and authoritative advisor to whom they may refer in matters of misunderstanding that may arise on the job, guarantees for them fairer treatment from employers and removes to a large extent the temptation to "quit" and to "try another job" on trivial pretexts. The inevitable result of drifting from job to job is the careless taking of any kind of a job, and the formation of the casual habit. A youth following this course becomes, before he knows it, a confirmed casual laborer, always ready to try something new, ever ready to "loaf a bit." In many cases he eventually becomes practically unemployable, discontented, unsocial if not actually anarchistic. By following up and maintaining a contact with the workers he has placed, the placement official can exert an influence which tends to steady the youthful worker. Through this contact he may be able to keep before the worker the vision of bettering his condition through efficient service and square dealing with his employer.

The worker must be taught to appreciate the value and the necessity for cooperation with his employer. He must be taught to recognize that in return for an opportunity to work at a fair wage, under courteous treatment and under sanitary and comfortable working conditions he owes his employer conscientious service, thrift in the use of material, carefulness in the handling of tools and machinery, promptness, regularity, loyalty, and proper notice of withdrawal from service. The extent to which both employer and employe can be encouraged to apply the golden rule determines in a large measure the progress the worker may make in his vocation.

Frequently there comes in follow up work the difficult task of persuading the boy or girl to give up a blind alley job chosen on the basis of present wage to take another job at a lower wage but which offers an opportunity to learn while earning. For some individuals there can be no such thing as a blind alley job, but for a large percentage of the average boys and girls except in the cases of those endowed with an unusual capacity for initiative, much of the employment open to junior workers offers little training and offers no opportunity for advancement to higher levels of employment. A child entering and continuing in the blind-alley type of work finds himself stranded at 16 or 17 years of age, deficient in common school education, untrained and unfit for any employment except casual manual labor. Inherent capacities through repression may atrophy, or through lack of opportunity for development may lie unawakened and never be discovered.

Many boys and girls well placed, liking their jobs, capable of meeting the requirements of their jobs, fully intending to meet those requirements, may still be in great risk of falling by the wayside. They may come from homes where they have been the center of attraction, from school where they have received recognition and praise for every attainment. During their initial experience in industry they find themselves the least essential and lowest paid among the workers. They lack the judgment necessary to understand their insignificance. A little follow up work, a little contact maintained by the placement official may prevent that feeling of resentfulness which tends to grow and which begets the spirit of the I. W. W. and the anarchist. A little interest taken in the young worker's progress may turn discouragement into encouragement and make the job lead to a career.

The success of educational effort to better prepare pupils for vocations can be assured only through recognizing the facts regarding the demands of the commercial and industrial world. These facts must be secured and made available for educational purposes. In carrying out its follow up work the placement bureau has the best possible opportunity for securing vocational information. If children are rejected a followup system discovers the reason. If workers placed fail to make good, followup discovers wherein they did not meet the requirements of the job. Training may be provided for those who come after which will enable them to successfully meet those requirements and make good.

In measuring the success and efficiency of the placement bureau the number of placements made in proportion to the number of referred children may not be a true measure. This may merely indicate labor turnover, which means inefficiency. The true measure of success and efficiency is the number of contended workers retaining their jobs, loyal and buoyant in spirit, believing in their opportunity and ability to advance.

A successful and efficient school placement bureau renders a valuable service to employers and renders a much needed service to boys and girls.

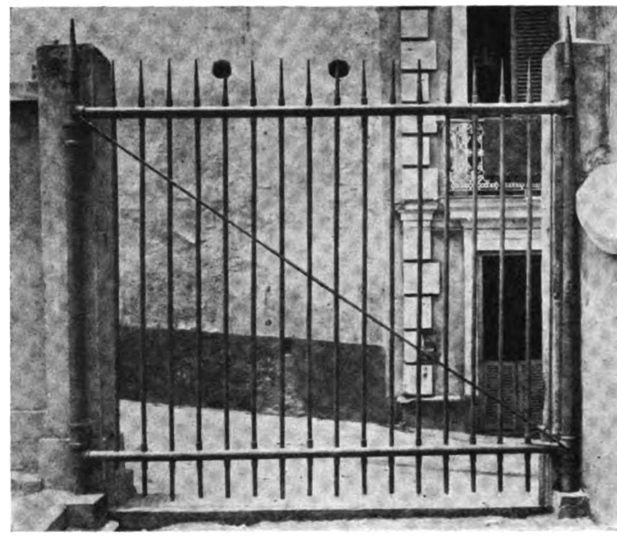
A PRACTICAL PROBLEM IN PIPE FITTING

Herman Hjorth, Director of Technical Work, Roman Baldorioty de Castro Graded and Technical School, San Juan, Porto Rico

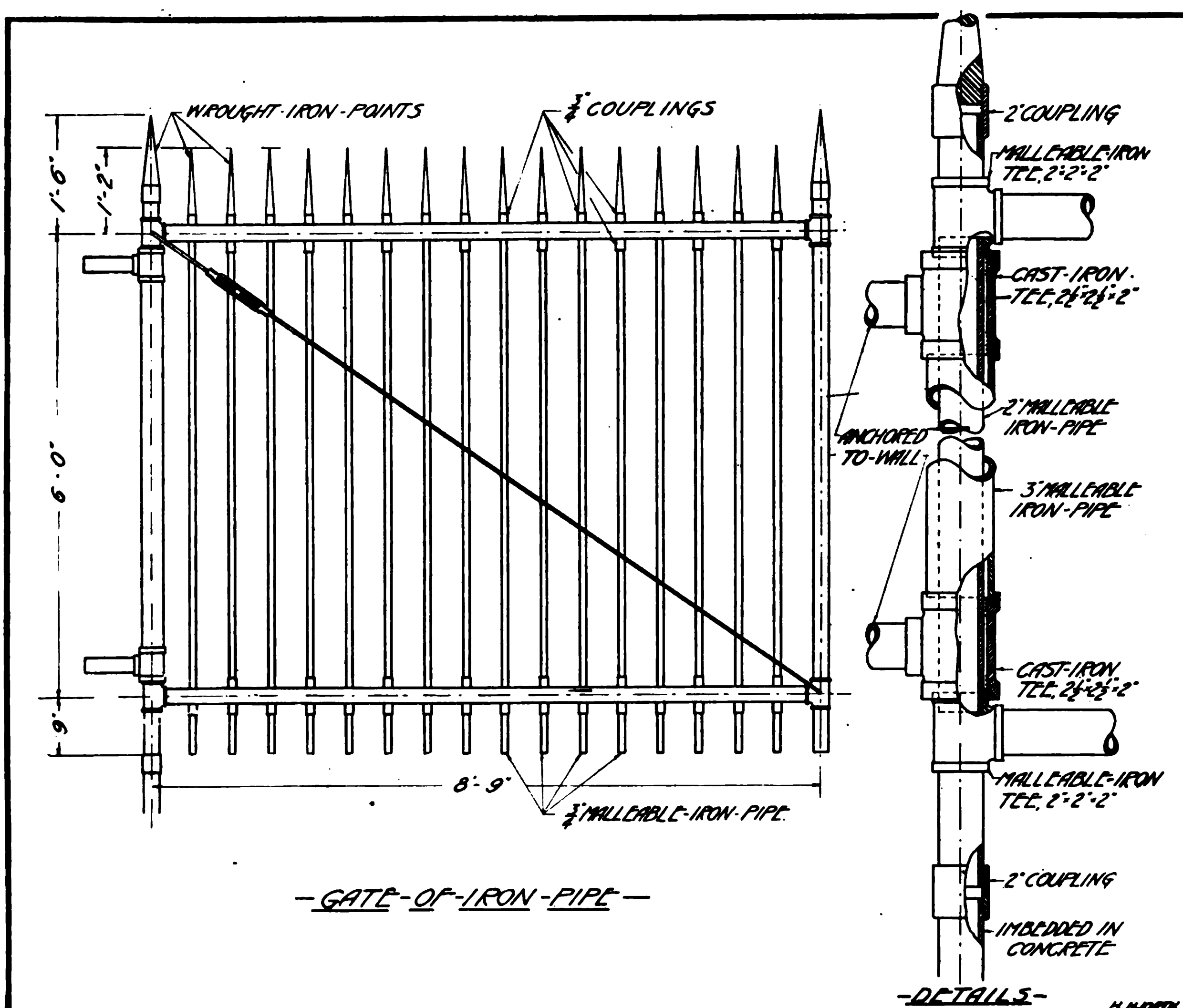
WHEN the Baldorioty de Castro Graded and Technical School was finished in 1918, no funds were available for the ornamental iron fence, with which the architect intended to enclose the grounds of the school. As a fence is of paramount importance in this locality, the technical department of the school was asked to construct a provisional fence of some kind. The requirements were: strength, durability, neatness, and, last, but not least, economy.

After considering various materials, malleable iron pipe was finally chosen, and the design and construction of the fence and gate illustrated herewith was worked out by Mr. Harry E. Jarrett, instructor in plumbing, and the writer.

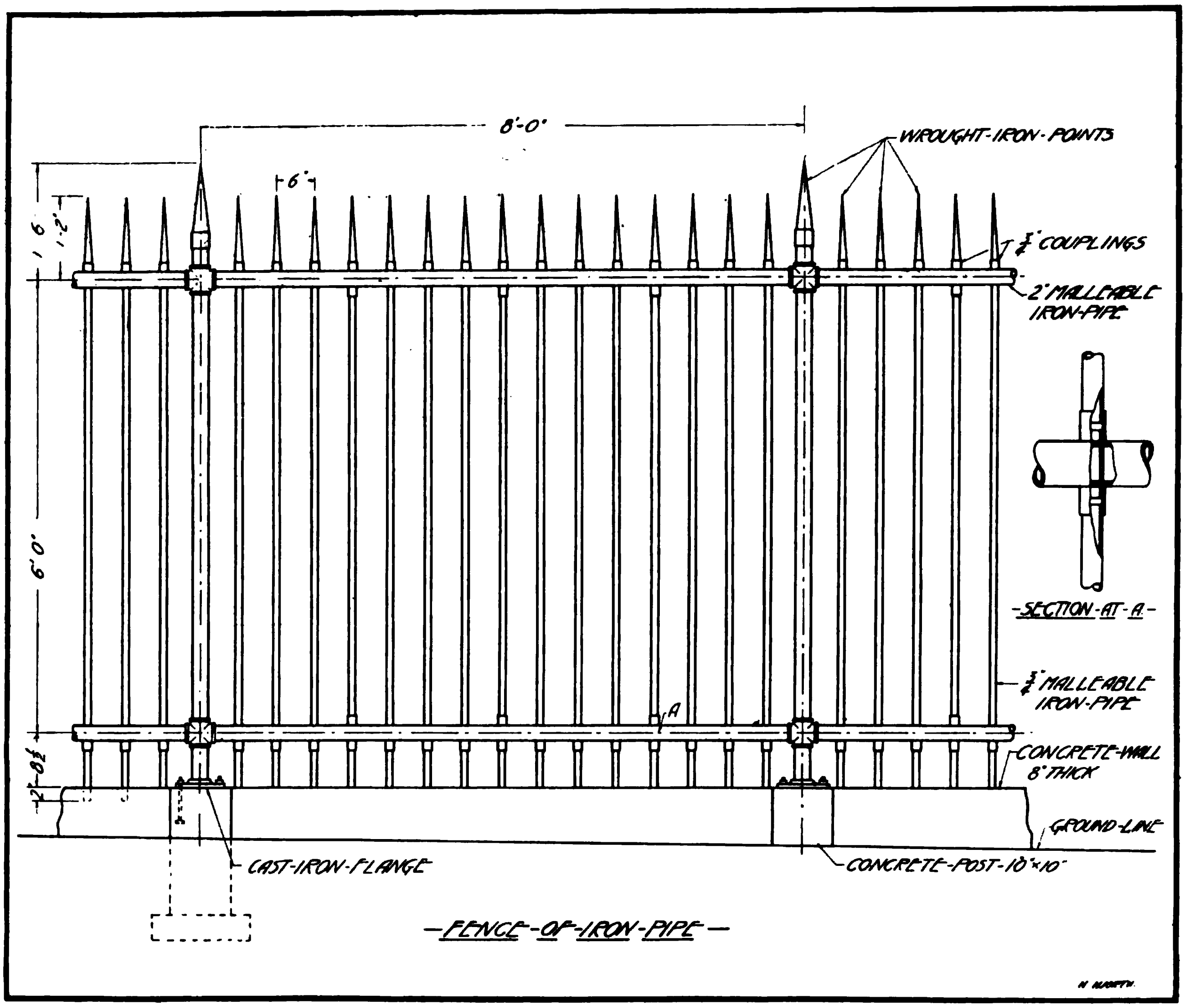
The construction of this fence does not necessarily presuppose a knowledge of plumbing, but it may in fact be worked out in a machine shop or even in a woodworking shop, if the necessary tools are provided. The work here was divided among the different shops in the following manner:



THE GATE SET IN PLACE.



DETAILS OF GATE OF IRON PIPE.



DETAILS OF PIPE FENCE.

The plumbing department did the actual cutting, threading, assembling and erecting of the fence and gate. To the machine shop was allotted the work of turning the tapers on the iron points, recessing the Tee's on the gate, drilling the holes in the 2" pipe for the ¾" pipe to pass through, and milling the ¾" couplings to fit the curve on the 2" pipe at the top of the fence. The molds as well as the actual concrete work was done by the woodworking department, and drawings and blueprints were gotten out by the mechanical drawing classes from preliminary sketches and specifications.

With regard to the actual construction of the fence, the following points may be of interest. The fence was made in sections of two panels and three panels. A two panel section consists of four 2" horizontal pipes and three vertical ones. A cross was screwed on each of the horizontal pipes and two crosses on the vertical pipe in the center. Two horizontal pipes were then screwed into each cross on the vertical pipe, thus forming two long horizontal pipes connected by one vertical pipe in the center | . On each of the remaining two vertical pipes a long thread was made on one end and a regular thread on the other. The ends with the long threads were first screwed into the crosses on each end of one of the horizontal pipes as far as possible. They were then backed out, and at the same time entered into the opposite crosses on the other horizontal pipe, care being taken to have the distance between the horizontal pipes the same at all points. On account of the long threads the vertical pipes do not slip out of the lower crosses.

These vertical pipes could also have been fitted together with the two horizontal pipes by means of a right and left thread, but as right and left crosses could not be had in San Juan, we were obliged to use the long thread method.

The tapered points were turned from wrought iron bars and the threads cut with stocks and dies in order to fit the 2" and ¾" couplings. The ¾" couplings on top of the upper horizontal pipe were milled to fit the curve of the pipe, but none of the other couplings were milled, as they had to be screwed up.

The gate was fastened to a concrete post, and the pipes forming the hinges led into holes cut in the concrete and corked with lead. If conditions had demanded it, the gate could have been put into the fence at any point simply by fitting two extra Tee's into the nearest vertical 2" pipe and screwing the pipes forming the hinge into them. A right and left thread would have to be used in this case.

Summary of Work.

Plumbing Shop.

1. Measuring and cutting pipe to length.
2. Cutting of threads and a study of different makes of stock and dies.
3. Measure of fittings and calculation of allowance for same.
4. The making of a long thread and its use. Right and left threads.
5. Assembling sections of fence according to blueprint.
6. Erecting sections on posts and fitting them together.
7. Corking with lead.

Machine Shop.

1. Taper turning.
2. Use of milling machine.
3. Laying off and centerpunching 2" pipe for holes to be bored for ¾" pipe.
4. Use of drill press.
5. Chucking and recessing cast iron Tee's.

Carpenter Shop.

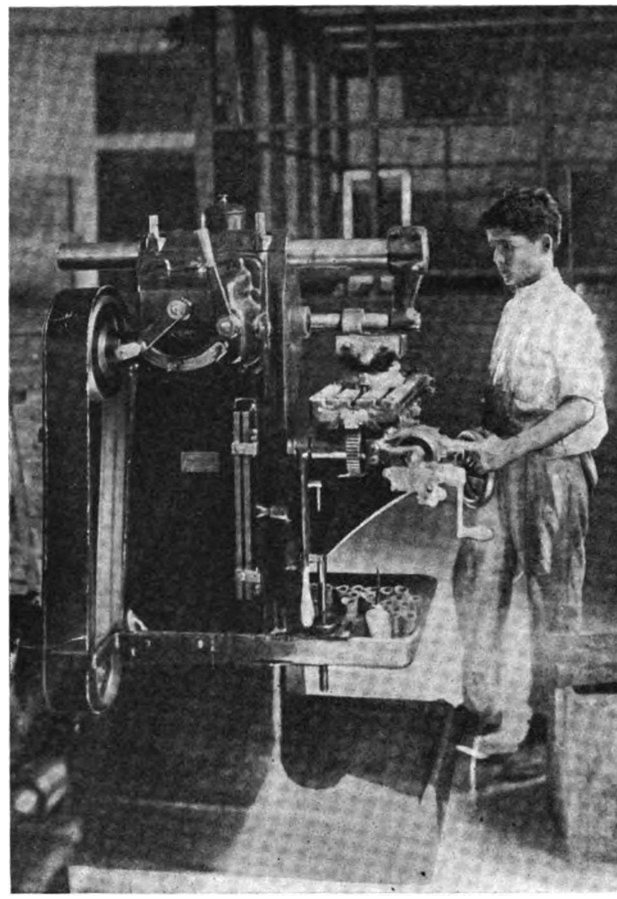
1. Making of molds for concrete posts and intermediate walls.
2. Placing molds at proper distances, level and plumb, and bracing them.
3. Mixing and placing concrete in molds.
4. Removing molds, facing up and curing of concrete.

Drafting Room.

1. Making of drawings according to preliminary sketches.
2. Tracing.
3. Making of blueprints.

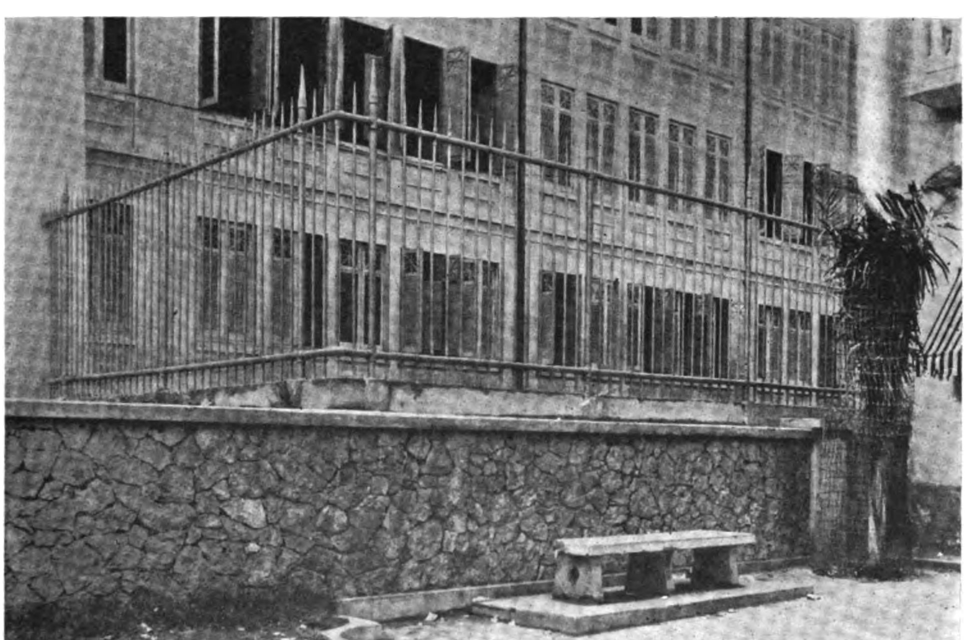
Arithmetic.

1. Calculation of length of pipe and number of fittings necessary.



BOY AT WORK ON FENCE PARTS.

2. Problems in pipe fittings.
3. Calculation of wrought iron necessary.
4. Problems in taper turning, feed and speed of lead screw, drills, milling cutters.
5. Calculation of lumber necessary for forms.
6. Calculation of volumes and weights.
7. Cost of pipe, fittings, wrought iron rods, bolts, lumber, stone, sand, cement.
8. Cost of fence per foot.



THE FENCE AS IT APPEARS TODAY.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

ORGANIZED SOCIETY.

The president's address stressed the need of individual rather than collective responsibility and accomplishment. Warming up to his subject, he lamented the present tendency of the individual to assume that organized society would relieve you and me of doing anything more than behave ourselves under the law.

Organized society has given us a fair chance for the development of our faculties on the supposition that we would return to it in service some measure of the bounty of life and talents developed. It was a timely and appropriate address. It emphasized the imperative need of government by and for the people. It emphasized a weakness of our teaching and of our pupils. Of our teaching, in that our school work had been a routine of lessons to be learned, without question of results other than the program of class exercises.

Of our pupils, in that they had come to school, gone through the course of study, and now were about to graduate as a matter of course established by organized society. What of it? What more can be done than to put that long line of boys and girls under the restraint of definite tasks to perform? What can be better for them than the orderly and persistent training in the conventions of living under organized society? What can be done more than to give them a definite understanding of the things that are and are to be, so that their lives may be adjusted to life as it is, or *as it may be?*

Ah! there is the keynote of the president's injunction. *Life as it may be.* The ability, incentive, and ambition to do something individual for organized society. Not to be just a persistent, busy parasite living on the bounties of nature and organized government, but like the bee, who gathers a bit of sweetness from each blossom and never fails to add a tiny bit of its own individual flavor that transforms the common product into nectar.

OUR LOVE OF ART.

We are now several years on the way to emphasis that art and industry are inseparable. In this emphasis we have drawn conclusions that have not been altogether logical, and we have followed methods of instruction that have not been effective. In the attempt to develop greater skill in design we have often neglected the emotional element without which no great artistic results can be secured. Morris Gray, President of the Museum of Fine Arts of Boston, states in his 1920 report:

"Knowledge about art is common, but love of art that brings happiness and inspiration to the heart of man is rare. One is an intellectual interest, the other is a great emotion. Yet the two are often treated as identical."

There can be no question as to the emotional element necessary to fine art production and appreciation. The problem from the teacher's point of view is the identification of the emotional over the intellectual and the process of developing each.

The frequent confession of the beginner who is brought to a sense of obligation with regard to art, is significant. "I know nothing about art, but I know what I like." This statement indicates that independent choice is not based on knowledge, but is the inevitable heritage of all humanity in whatever stage of development. Every one makes some choice as a result of interest. The art teacher's problem is to give such experiences that will interest every pupil in beauty and propriety. To do this, there must be some innate or some developed incentive. These incentives cannot be developed by arbitrary tasks imposed without reference to choice or interest. Neither can they be imposed by a superior judgment, without conviction on the part of the pupil.

The idea that there is a final and formulated standard of beauty and propriety, to which pupils are to be brought by a series of exercises and a certain definite understanding, is fallacious. All true appreciation is the result of emotional satisfaction. Emotions are to be aroused only to be satisfied and give place in turn to new emotions. Emotion precedes intellectual calculation, and is the starting point rather than the ultimate result of educational process. What we need more than other things in the way of art instruction is the inspirational teacher, who can enthuse his pupils with the desire to create and express their own genuine emotional interests, and so develop to greater emotions and the expression of them.

THE TEACHER AND OTHERS.

"I am placing every graduate of my school at a salary of eighteen hundred dollars and over," said the director of a college of education at the close of the past school year. Colleges of engineering, commerce, and agriculture announce a less favorable outlook for their graduates. These conditions will undoubtedly bring increased numbers to the schools for the training of teachers. It should, in time, allow a more careful selection of candidates for teaching positions.

For several years before the war the schools had gone forward rapidly in the requirements of academic preparation for teachers. The war turned many teachers to other occupations. Now they are coming back, but the demand for capable teachers still exceeds the supply.

Effective teachers have had opportunity during the past year to take a choice of positions from Maine to California. Many well established teachers have taken advantage of this opportunity to move, on the doubtful supposition that a change would give them a widened

advantage of this opportunity to move, on the doubtful supposition that a change would give them a widened experience and a greater outlook for the future.

Let us hope that the nomadic tendency of teachers will not be overdeveloped by this opportunity. Let us hope that the teaching profession will not become more itinerant and weaken the schools further by a constant change of the teaching staff, that merely satisfies the desire for a change on the part of teachers.

A teacher must become a substantial member of the community in which he teaches to perform his function to that community most effectively. The plan of increasing salaries for continuous service will be more worth while as a means of retaining the staff when the market for teachers becomes more stabilized. The conditions of the past year are but temporary. We may look forward to the development of a well ordered and efficient teaching force for the American schools. The American schools need such a force above all other needs.

THE SUMMER VACATION.

There are numerous ways of spending the summer months. Some will travel in Europe. Others will work in the commercial or industrial fields. Still others will attend summer schools either as students or as teachers or both.

Whatever method one chooses of spending the vacation months, the fundamental necessity is that the occupation shall be in the nature of a diversion. It need not be considered as mere diversion, but it should be undertaken with the lightness of spirit and freedom from strain which characterize diversion.

We rest by change of occupation, not by ceasing to be active. Almost every large mercantile establishment will have teachers on the pay roll. Of course, the element of remuneration has its appeal. Perhaps some would say that this constitutes the desirable change for the teacher and hence may be regarded as a diversion.

At any rate, whatever the teacher does during the summer months, should contribute to his freshness of mind, vigor of action and joy of life. In this way the teacher will be able to return to his duties in the fall with a buoyancy of spirit and newness of life, and a wholesomeness of point of view, that will put snap and interest into his work. Here's hoping that the hot summer weeks may be so emphasized that the teacher will return to the schoolroom better teachers than they were last year.

CO-OPERATION NOT CONDEMNATION NEEDED.

The more closely the industrial work can be tied up with the regular school program, the better it will be for both.

There has been an attempt on the part of some to gain recognition for their work by condemning the regular school and its program. It has undoubtedly been open to severe criticism, but so has the industrial work. Success lies not in condemnation and antoganism, but in generous, constructive criticism and cooperation.

The academic school man must come to see that industrial education is a necessary part of every school program. The industrial and vocational advocate must come to understand that his work is only a part of the program and not the whole thing. There are critical times ahead for industrial education. It still has a defensible curriculum to build. It still has the problem to solve of efficient teaching. It still has waste to be eliminated. It will be under the necessity for some time to come of making complete justification for the comparatively large expenditures for its equipment and maintenance.

Instead of condemnation and criticism, let the industrial teachers cooperate in every possible way with the regular school program. Let them consider their work a part of the whole great scheme of education and offer every possible assistance in carrying it all to a final success. And let them see to it that their own work is so wisely planned and so efficiently executed, that no criticism can legitimately be cast their way.

In this direction lies success. In any other direction lies at least partial failure.

Work is not the curse nor the affliction that some people think it is. When taken in proper doses it is the best of medicine. It is now being prescribed for many forms of invalidism such as heart disease, Bright's disease, nervousness, and particularly for insanity. The lack of work is often the cause of many chronic maladies and it is a wise physician who can determine when one needs work instead of rest and in prescribing the remedy produce no unpleasant situations. About the most unhealthful person, as well as the most unhappy and useless, is the person with nothing to do.

Work is a dispeller of fears. It is the exercise that is as essential to the body and mind as are food and air. It is only when work is carried to excess that it becomes injurious, as in the case with food, rest and all good things.

The ideal of a healthy, happy life is no longer a world where work is not necessary and life is one grand sweet song of idleness. Life is activity; in the broad sense, it is work—work that produces and entails sacrifice. It is not less work that we need, but work in the right proportions and under the right conditions. Such work is health.

"One of the greatest things that can be produced in the child is the habit of service—doing something for somebody else besides himself. * * * He has been started right during the war, and, if we can perpetuate that thing, if we can show him that by being of service he is expressing what is after all the fundamental emblem of democracy, and that to be a citizen of a democracy carries with it not merely a benefit but a responsibility of service, we are doing the best possible thing to breed sound, faithful citizenship."—Livingston Farrand, Chairman, American Red Cross.

The Home Shop and the Manual Training Teacher

A few days previous to the Christmas holidays a manual training teacher visited the offices of the Industrial-Arts Magazine to renew his subscription and to exchange the greetings of the season. He was smoking a good cigar and wore that air of satisfaction which only follows an excellent meal. In the course of the conversation, it developed that he had just spent an hour with a prominent businessman, who had invited him to lunch to get his advice on the purchase of a kit of tools—a Christmas gift. The businessman recognized in the manual training teacher an expert in wood working, and availed himself of the latter's friendship to help in picking out tools for the home shop in which his boy was greatly interested.

The visit to the tool department of a large hardware store proved particularly instructive to the businessman who had never used tools himself. The man made the usual mistake of believing that his boy should have tools of boy-size and he was considerably impressed with the stand taken by the manual training teacher. The latter insisted upon selecting tools of the best trademarked brands, such as are used by experienced mechanics. The number finally bought was smaller than the businessman expected, but each tool was of the best quality, well adapted to average use in the home, and fully within the powers of the average muscular boy of 13 or 14 years of age.

The foregoing true incident is related here to point out to manual training teachers that they frequently miss an opportunity in not influencing boys to have a home kit of tools and to make this kit of the best possible quality. The educational and vocational influence of the school shop can be made doubly valuable, if it is reinforced by a home shop, in which the boy can apply the knowledge and skill acquired in school to home repairs and to work in which he is genuinely interested.

In this connection, it is interesting to see that the Junior Achievement Bureau of the Eastern States League is actively promoting boys' workshops to be established in the homes. The league recently issued a bulletin, prepared by Mr. Frank O. Kreager, assistant director, in which a series of eleven outfits for various home occupations is recommended. While the suggestions were originally made for Christmas, they are so helpful and so well adapted for all seasons of the year that we are reproducing them here with a few minor omissions.

Toys and Presents.

Each year American parents spend millions of dollars for toys for Christmas presents. By New Year's day, a large part of these toys are broken, and lie in the corner or the backyard. Why? Because of the destructive habits children have developed. And why these habits? Because, since birth, toys have cost the children nothing. Children, like grown-ups, value and form habits in proportion to the cost *to them.* They break up what costs them nothing, and cherish and keep repaired what they, themselves, have made or purchased with self-earned money.

A remedy can be found in developing the constructive rather than the destructive in children by buying them for Christmas working outfits and books of instruction with which they can make and repair things for themselves. In other words, buy tools, equipment and supplies rather than finished toys. Carlisle said, "Man without tools is nothing; man with tools is all."

What to buy for each particular child depends upon the age and tendencies of the child and is a matter parents must determine for themselves. The important test is, "Is it something that the child can use and make things for himself, for others and for the home?"

The following are suggested outfits: In each case leave some part of the outfit for the children to make or buy from money they themselves have earned. In other words, cooperate with the children instead of doing it all for them.

Outfit No. 1, Paper and Cardboard Construction.

This outfit is very simple—scissors, glue or paste,

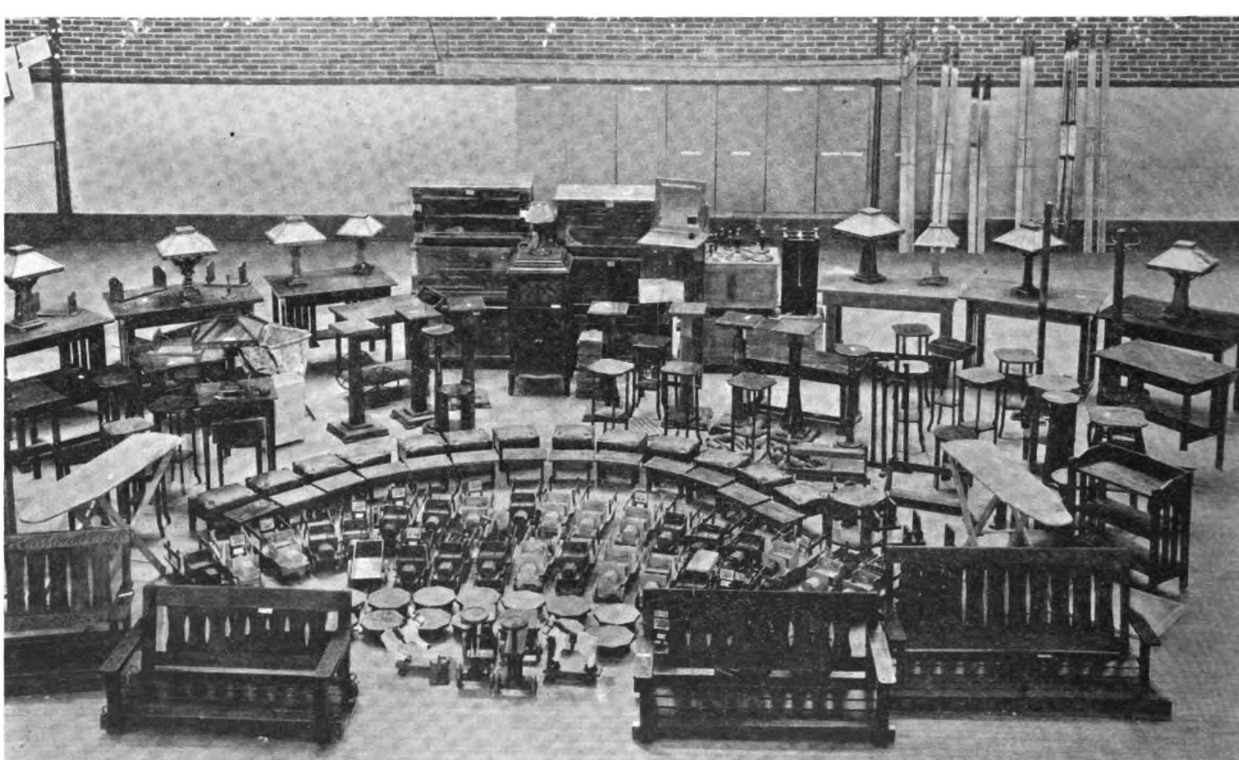


EXHIBIT OF WOODWORK, MANUAL TRAINING DEPARTMENT, CRYSTAL FALLS, MICH.
John Cassidy, Director.

A SCHOOL AND COMMUNITY PROJECT IN CEMENT.

A walk was needed along one side of the grounds of the Bellefonte, Pa., high school. The need was considered an opportunity for the Manual Training Department to work out a problem in cement construction. Under the direction of Mr. H. C. Menold, the boys worked out the levels for the walk and obtained the approval of the city engineer. They then proceeded to do the entire job from making the mixing boxes and preparing the forms and foundations to completing the final flooding of the surface finish. The illustrations show one of the mixing gangs and the completed walk.

ruler or measuring stick, pencil and some string, and a box to keep it in. It is especially suited to small children; with it and some instruction they can make animals and dolls, cardboard houses, furniture and toys. The total cost should not be more than one dollar.

Outfit No. 2, Coping Saw Work.

One coping saw frame.

A dozen saw blades.

A small awl.

A sloyd knife or a pocket knife, and a stone to keep it sharp.

Some sandpaper, glue, and string.

A block plane is a convenient, but not a necessary tool.

The material to be used is thin wood—cigar box wood or the veneer used for drawer bottoms.

A sawing board, to prevent marring the table, can be made from a board eight to twelve inches wide and eighteen to twenty-four inches long by boring an inch hole about two inches from the middle of one end and sawing a "V" shaped notch in the end to meet the hole. This may either be clamped to the table, or fitted with cleats in such a way that it slides on to the corner of the table. The sawing is to be done at the notch and hole which should project two or three inches beyond the edge of the table.

With the outfit all kinds of toys—animals, toy furniture, go-carts, jumping jacks, can be made, as well as a large number of useful household articles such as match boxes, trays, picture frames and mouse-traps.

This outfit without the block plane would cost from seventy-five cents to two dollars.

Outfit No. 3, Sheet Metal.

One soldering kit, consisting of soldering iron, soldering paste, emery cloth, scraper and solder.

A pair of tin snips.

Pliers.

A small iron vise.

A peen hammer.

The solder kit will contain instructions for its use.

Old tin cans form a never ending supply of material for this work.

The entire outfit should cost from five dollars to ten dollars.

Boys' Achievement Clubs have made with this simple equipment a very wide range of toys and useful kitchen and home articles such as bird houses, lanterns, ink-wells, chicken-feeders, nail-holders, cookie cutters, doughnut cutters, ash trays, light-houses, candle holders, scoops, blotter-pads, book-racks, match boxes sand-buckets bird-feeders, pen and pencil holders, desk sets, automobile arrow guides, shaving cups, water-wheels, and canteens.

Outfit No. 4, Bench Wood Work.

The following list, which would cost for good tools about twenty-five dollars, is a good one to start with:

1 cross cut saw.

1 rip saw.

1 claw hammer.

1 jack or smooth plane.

1 auger or one brace and a set of bits.

1 or 2 chisels.

1 screw driver.

1 try-square.

Other tools may be added later by the boy himself when he becomes more proficient with these. He can build his own work bench. A good temporary one can be made from a stout store box. A good tool chest can also be made from a box. Old store boxes offer an excellent supply of lumber if all nails are drawn out.

With this outfit, a boy can make himself generally useful about the house, and can build his own toys and equipment. Book-shelves, step-ladders, window-boxes, linen chests and ironing boards are a few of the many things that can be made with this set of tools.

Outfit No. 5, Picture Framing.

The chief item in this outfit is a picture frame mitre box and saw, which costs from $25 to $30. This is rather high for one child, but the cost becomes low in proportion when used by a large family, or a boys' and girls' club. With this framing box should be included a glass cutter and a cutting board (a perfectly straight bread board or drawing board will do), a hammer, screwdriver, some screws, nails, brads, and glue.

With such an outfit a boy or girl can frame pictures for the home or school in a very creditable way. Frame cases can also be made for collections of leaves, grasses, minerals or insects.

The picture molding can be bought from a dealer.

With the addition of a combination plane, costing about fifteen dollars, the boys can make their own picture molding.

Outfit No. 6, Shoe Repairing.

The iron standard, lasts, awl, knife, hammer, etc., can be bought as a complete outfit at almost any hardware store. The cost would be about three dollars.

With such an outfit the boy can half-sole and repair his own shoes, shoes of the family, and earn his pocket money by repairing shoes for others.

Outfit No. 7, Painting and Varnishing.

Four or five brushes, varying from one-quarter to three inches in width, some sandpaper, a steel scraper, paint remover, a putty knife, some putty, a can of crack-filler, bottle of turpentine, bottle of linseed oil, some small cans of ready mixed paint and varnish.

With this outfit the boy can keep the floors, standing woodwork and furniture of the home in first-class condition, re-paint his toys, and paint his own constructions.

If some gold and silver enamel are added, he can do some very creditable work in gilding picture frames. The entire outfit should cost about eight dollars.

Outfit No. 8, Sewing.

A work basket containing a supply of needles, scissors, tape, thimble and thread. For smaller girls a hand-operated sewing machine costing about six dollars, might be advisable,

The girl of twelve can learn to operate well the full-sized or regular sewing machine. Small girls should begin by making their own doll's clothes. Larger girls should be taught to mend and make simple clothing for themselves; a girl of eighteen should be able to make her own clothes.

Outfit No. 9, Millinery.

Milliner's glue, wire, buckram, shears, needles, thread and thimble, and pair of pliers. These may be secured at millinery shops. The equipment and supplies, to begin with, should not cost over five dollars. Take a few old hats apart carefully and find out how they are made. Girls should begin their work by making doll hats, and will soon be able to make their own.

Outfit No. 10, Leather Working.

One riveting set and a supply of glove clasps, one leather punch, shears, knife, a plate of smooth glass (window pane will do). Set of leather tooling tools.

Leather can be secured from a store handling art goods. With this outfit a very wide range of useful and ornamental articles can be made. This outfit should cost about five dollars.

Art leather work is especially adapted for self-expression and development of artistic children.

Outfit No. 11, Art Metal Work.

For children artistically inclined a metal working equipment is especially desirable. Many beautiful and useful articles can be made from a simple equipment consisting of a ball peen hammer, a steel block or anvil to hammer on, a metal saw, a pair of tin snips, a metal drill, and a supply of sheet brass and copper, and copper wire and rivets. For raised work, such as vases, special anvils or stakes are needed.

With a brazing outfit, this work can easily be developed into craft jewelry.

As a means of supplementing any home shop outfits Mr. Kreager suggests that at least one book relating to the particular type of occupation undertaken accompany the gift of the actual tools. He recommends the following list as particularly helpful:

Home Achievement Library.

The following is a partial list of the books suitable for the Children's Home Achievement Library. At least one book should be selected for each of the foregoing outfits.

Buxton & Curran's Paper & Cardboard Construction (Manual Arts Press, $1.50).

Johnson's Toys and Toymaking (Longmans, $1.60).

Polkinghorne's Toymaking in School and Home (Stokes, $3.50).

Worst's Industrial Work for Middle Grades (Bruce Publishing Co., $3.50).

Thatcher's Simple Soldering, Hard and Soft (Spon & Chamberlain, 75 cts.).

Adams' Carpentry for Beginners (Moffat, Yard & Co., $1.50).

Collins' Amateur Mechanic (Appleton, $1.50).

Zerbe's Practical Mechanics for Boys (N. Y. Book Co., 75 cts.).

Beard's Shelters, Shacks and Shanties (Scribner, $1.75).

Zerbe's Carpentry for Boys (N. Y. Book Co., 75 cts.).

Goldsmith's Practical Things with Simple Tools (Geo. Sully Co., 75 cts.).

Hall's Carpentry and Mechanics for Boys (Lothrop, Lee & Sheppard, $2.50).

Collins' The Book of Electricity (Appleton, $1.50).

Hall's The Boy Craftsman (Lothrop, Lee & Sheppard, $2.50).

Hasluck's Mounting and Framing Pictures (Cassell & Co., $1.00).

Nichols' The Building of a Shoe (Nichols, $2.00).

Galloway's Staining, Varnishing and Enameling (The Trade Papers Publishing Co.).

Hasluck's Boot Making and Mending (Hasluck).

Everybody's Paint Book (M. T. Richardson & Co.).

Beard's American Girl's Handy Book (Scribner, $1.00).

Paret's Harper's Handy Book for Girls (Harper, $1.00).

Hall & Perkin's Handicraft for Handy Girls (Lothrop, Lee & Sheppard, $2.50).

Goodwin's Home Course in Sewing (Beatty, 50 cts. and 60 cts. a volume).

Laughlin's Complete Dressmaker (Appleton, $1.75).

Reeve's Practical Home Millinery (Longman).

Bottomley's Practical Millinery (Illustrated Milliner Company, $1.25).

Mickel's Leather Work (Manual Arts Press, 75 cts.).

Carter's Artistic Leather Work (Spon).

Rose & Cirino's Jewelry Making and Design (Metal Crafts Pub. Co., $6.00).

Rose's Copper Work (Metal Crafts Pub. Co., $2.00).

Payne's Art Metal Work with Inexpensive Equipment (Manual Arts Press, $2.25).

The Boy Mechanic (Popular Mechanics Co., $2.00).

Dolls designed and made by high school art class under the direction of Miss Malcolm Huff.

THE FARM PROJECT AS A HOME IMPROVER.

Oliver F. Kilham, Newberg High School, Newberg, Ore.

How are we to keep the worth-while boys and girls on the farm? This question has been a serious one in this country for a number of years; and our recent census figures would appear to indicate that it is to be an intensely vital problem in the immediate future. How are we to get wide-awake, rural-minded young folk of all classes to incline toward farming? The Smith-Hughes project may be used in at least one way as an instrument for good along this line.

Since I first entered an agricultural college back in 1902, it seems to me that the main stress has always been put on the ideas involved when we say "the home project as a farm improver." And who shall say that the farm has not been improved, and improved, and improved? And is it not true that this has been done more often than not to the utter blotting out of the idea involved when we say "the farm project as a home improver"?

The business of the merchant, the lawyer, the plumber and innumerable others is, in nearly every case, his home improver. It provides the money that in turn is invested in modern improvements of all kinds in and around the home, of which the house is a part. These men admit that to have these socalled "better things in life" is one of their principal aims in carrying on their business.

But what of the farmer? His business has, in too many cases, been carried on at the expense of his home, rather than for the sake of its improvement. We can go into some of the most prosperous farming communities in the country, and on a farm with big red barns bursting with food and comfort for the farm animals, find a small, poorly built, poorly arranged, cheerless house—and no home.

To have a home we need not necessarily have a big house; but we should have a house that shows some sign of good taste in the building. We should have a well-arranged house, with plenty of light, running water, electric lights, modern bathing facilities, if possible,—in short, whether we have the things mentioned or not, we should have the things that make for convenience, labor saving and comfort.

And mind you, not the things the older generation feel are needed for comfort and for right living, but rather the things that are demanded by the younger generation. Of course, it is understood that there are times when the farmer's pocketbook will not stand the strain of such improvements. If such be the case, then let him beware of providing sumptuously for farm needs. Right here lies the primary reason for the exodus from farms to farmer-towns.

A recent survey in Missouri where 645 farms were taken at random, gave the following:

Only 55 had modern lighting systems.
Only 62 had indoor water supply.
Only 37 had modern sanitation.
Only 40 had up-to-date ironing equipment.
Only 34 had a bread mixer.

And of these 645 farms, 407, or 63 per cent were owned by their managers. And of these owners, 55 per cent owned one or more automobiles. Only 62, or 11 per cent, had an indoor water supply. Women carrying water!

In the December, 1920, number of the Pacific Homestead, the editor, Mr. Carle Abrams, said: "Let us pay more attention to modernizing the farm home. If nothing else, it will prove one of the most important factors in keeping the children from leaving the farm for the city, where such conveniences are to be had.

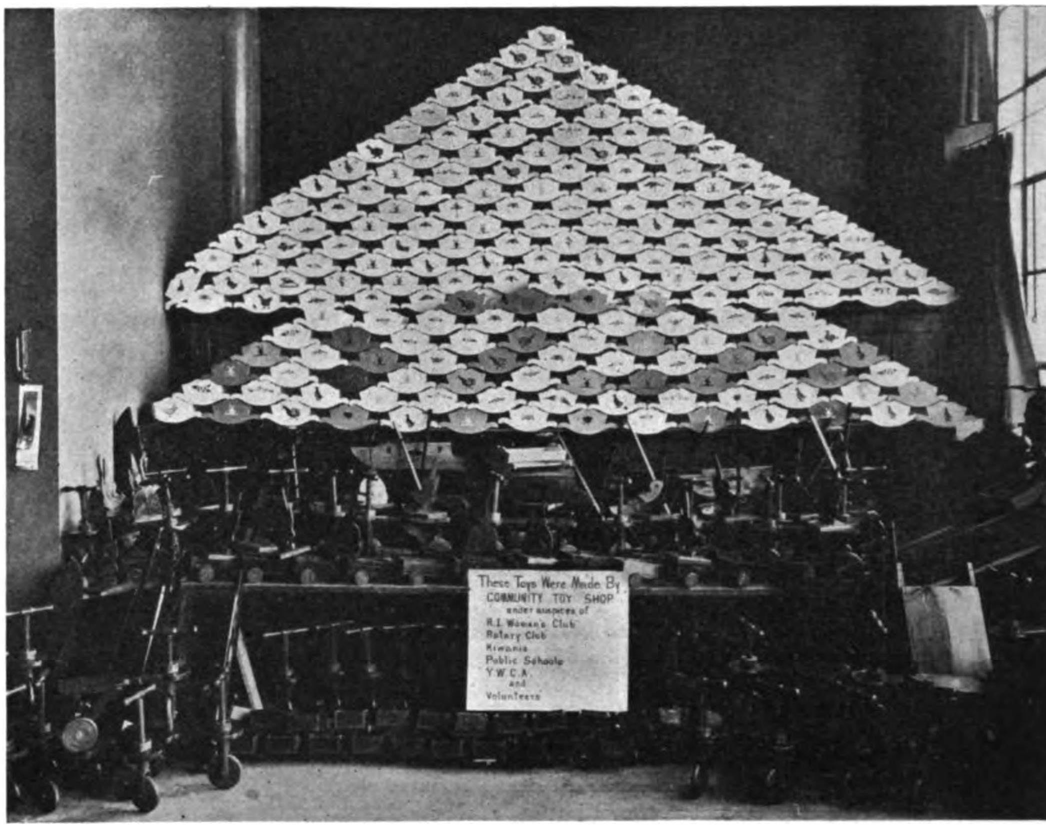
Young people do not dislike farming. Anyone who says so does not know them. They take the keenest delight in everything that the farm stands for except drudgery and neglect. They certainly do not like the penuriousness that causes them to live for ten or twenty years in the same house, with the same lack of comfort that existed when they were two or three years of age, and their parents were just getting a start.

One of the greatest incentives to civic pride and civic improvement is pride in the home and improvement, as the days go by, of all that appertains to it. It goes almost without saying, then, that the home improvement work—the work that by its results has given the desire for civic improvement—also has distinct and measurable economic or money value.

We all know how land tile drained will add to the inventory of tillable acreage, and we all know that a newly built barn may constitute a permanent improvement that will add to the farm value out of proportion to the amount expended for such improvement. Artificial irrigation often gives an increase in crop production, and consequently in net income and value of property, far in excess of what might be expected from the initial cost of installation.

Improvements in the house, such as devices for labor saving, for comfort, and for beauty, pay just as truly as improvements on any other part of the farm. Improvements on the grounds, especially about the house, and judicious planting of trees, shrubs and flowers, will mean continual increase in property valuation as the years go by. A home property built for $12,500 later sold for $20,000, solely because of careful landscape plantings. A better property, 200 feet away, costing originally $14,000, was offered for $12,500, and the offer was refused, because the purchasers wanted a home, and the other

EXHIBIT OF MANUAL TRAINING PRODUCTS OF THE HIGH SCHOOL, IRON RIVER, MICH.



Toys made in the Rock Island, Ill., schools by manual training classes for charitable use.
Mr. A. W. James, Director.

"looked too much like a barn." The sale was made entirely on the strength of the fact that the home grounds surrounding the property were beautifuly laid out in every way.

Mr. John Watson, secretary of the American Association of Nurserymen, has suggested the following for use in this connection. Take a man who has built a $20,000 house. He would probably spend at least $10,000 for the furnishing of the inside of that house. Such a man, Mr. Watson says, as a rule will spend about $2,000 on outside plantings. He uses the place twenty years and then sells. His inside furnishings have a selling value of not more than $5,000, while all things considered, the outside plantings will have increased in value from $2,000 to in the neighborhood of $10,000 and both have been used and enjoyed for the greater part of twenty years.

It has been found in Newberg that pushing the Smith-Hughes project as a home improver has created in the boy a very keen interest and response. The home, the boy feels, is just about as much his as Dad's, and he takes pride in making it a better one. The farm—all theories to the contrary notwithstanding—is Dad's. The boy knows it, his Dad knows it, you know it, we all know it. There is no way of getting away from it. In the farm, aside from the home, the boy has never had that sense of proprietorship that is so necessary to interest and enthusiasm.

Let no one get the idea that we ignore the project possibilities as a farm improver, for such is not the case. But we have found that thru an agency like the Newberg Farmers' Club, for instance, we can often reach and help the adult farmer far more efficiently than is possible thru a pupil's project. Personally, I do not believe in making the boy's Smith-Hughes project the pack-horse for all the enlightening and reformation material the United States Department of Agriculture plans to get to the farmer.

There is also a certain psychology entering in right here that must be considered. We are all human, as it happens, and no adult, particularly the farmer adult, enjoys being instructed by one years younger than he, even tho it be his own child. Rightly or wrongly, many adults feel a certain loss of self satisfaction and of prestige thru the process. Let the boy do the very best he knows how with his project. Let him show a becoming modesty concerning his knowledge that will be suited to his years. Let him display his superior methods, if he has any, without the blare of trumpets and the call of the crier. Then let all of us who are in Smith-Hughes teaching work, keep in mind the fact that the farmer can take or leave as he sees fit.

Let us all remember how little we know and how much the practical farmer knows. Such an attitude will mean power for our boys; the heartiest cooperation from the farmer; success for our Smith-Hughes work; and increasing knowledge and understanding for all of us.

So shall we help to make the farmer class the greatest power for good among the social classes. So shall we contribute toward ever increasing prosperity in community, county, state and nation.—Salem, Ore., News-Item.

Forestry Lessons on Home Woodlands. Wilbur R. Mattoon and Alvin Dille. Bulletin 863, 1920, U. S. Department of Agriculture, Washington. The pamphlet outlines lessons which present the subject from the standpoint of the important local kinds of forest trees and their uses, the location of woodlands on the farm, the different timber products, the utilization of timber, protection and improvement of woodlands, and the planting of young timber. It takes up in detail a study of illustrative material, home projects, and marketing farm timber.

Utilization of Black Walnut. By Warren D. Brush. Bulletin 909, 1921, U. S. Department of Agriculture, Washington. For the past six years there has been a revival in the walnut-furniture industry and large amounts of the wood have been called for. The bulletin which is beautifully illustrated with the different species of the wood, deals with its characteristics, properties, uses, manufacture and market value. The pamphlet contains a production map of the United States, a table of properties actual and comparative, and one of production by states.

INDUSTRIAL ART—A PEACE EMERGENCY*

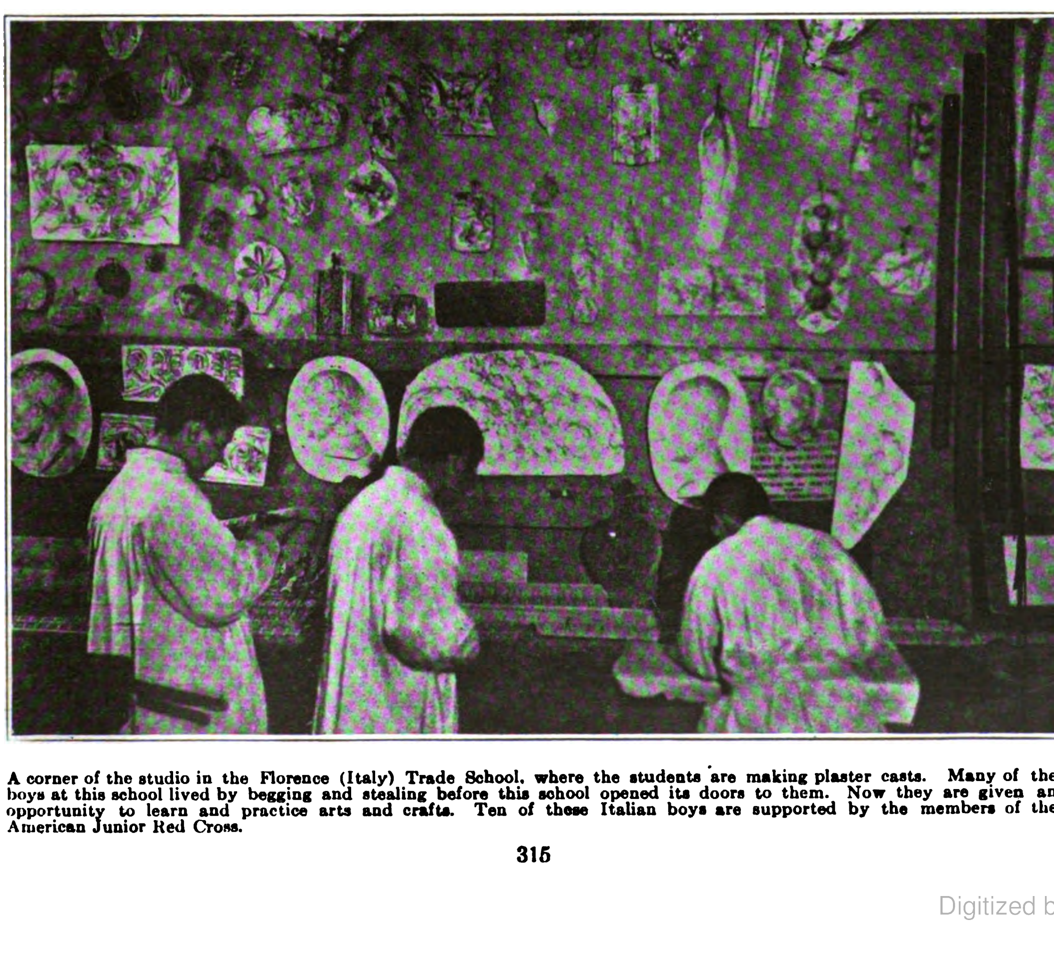
Richard F. Bach, the Metropolitan Museum of Art, New York, N. Y.

We speak of morale in the open fighting field, we count upon the morale of those at home in the service of production and supply, yet we have never realized that this term must be applied to every line of effort that engages our minds and hands if the national cause is to be served—even to the arts of peace upon which the country must so largely depend in regaining its equilibrium and normal course of life now that the job over there is done. Have we ever considered the meaning of morale in the fine arts? In the maintenance of the fabric of national art impulse, in satisfaction, poise and peace of mind, the industrial arts serve among the greatest agencies of national progress; theirs is a serious undertaking, to maintain morale in the face of almost impossible conditions, not only as to labor and material, but as to design and taste.

For the first time, during the war, the industrial arts manufacturing fields clearly saw that their own shortsightedness had brought them a most serious handicap. The machine had faithfully served them for many years, so faithfully indeed had it wrought their many forms and weaves that its owners had all but forgotten that the mechanism had no thoughts of its own. The war isolated the United States and we counted among our resources machines galore, fine raw materials, excellent technical ability, but no designers and inadequate schools to produce others to make good the shortage due to the occupation of Europeans in duties of belligerency. True values thus demonstrated the real position of the machine, not as a thinking automaton, but as a glorified tool which might be misused as readily as correctly applied. Manufacturers who had long had ugly presentiments as to what might happen if their industries should ever be isolated from European sources of supply as to design and taste, saw that the day had come too soon. They had never advanced any educational propaganda, they had helped to found no schools, they had seen for many years only the advantages of the present, they had not built for the future of American industrial art. While an American harvesting machine was a prize for the European, an American industrial art object, with few exceptions, remained little more than a near-barbaric curiosity.

But even yet the industrial arts manufacturers, the furniture and furnishing producers, have not made direct and general use of some of the most obvious and most immediately available advantages that could be offered to any branch of production. To be sure they have their problems of obtaining material, of holding labor to turn this over into executed pieces, and, just now, chiefly of persuading middlemen to buy. But what has the manufacturer done in the field of design? Has he reached out for every possible avenue of assistance in the most important field of all, namely, that of improving the appearance and appeal of his pieces so that he may prove the calibre of his designers? Has he considered the value of the possible trade mark: *Designed and made in the United States?* And finally, in the absence of schools for craftsmen—the woeful lack of which the war so plainly showed—has he made the museum collections in our great cities a part of his working plant? Has he ever calculated the asset value of the museum in his city as an inspiration, as a source of information for design and actual models, as a center for study and research, in short, as an out-and-out working laboratory? It is safe to say that such a conception of the museum's function is a novel one from the average manufacturer's point of view. Now is the time for him to discover what the great collections throughout the country have to offer, what extensive arrangements have been made in the large museums to provide or make accessible the fine examples of the craftsmanship of other days. Now is his time to begin in a thorough-going way to make himself acquainted with the contents of these great galleries, with the finely organized resources for study—golden opportunities for his de-

*From the Bulletin of The Metropolitan Museum of Art.



A corner of the studio in the Florence (Italy) Trade School, where the students are making plaster casts. Many of the boys at this school lived by begging and stealing before this school opened its doors to them. Now they are given an opportunity to learn and practice arts and crafts. Ten of these Italian boys are supported by the members of the American Junior Red Cross.

signers. There is but one demand upon his time, that of going to the museum; books he may have in his own office library, but the great collections of originals from which to inspire and model offer the resources of contour, color and depth which the finest engraving and measured drawing can but remotely suggest.

We can only repeat, there is nothing "highfalutin" about a museum. There is nothing difficult or far-fetched about an exhibition of originals. To be sure, they cannot be handled, they are housed in a splendid architectural monument worthy of them, they must be under guard, and they must be perhaps in a structure located in a public park requiring a ten-minute trolley ride. But does all this mean that their great value must be ignored? Glass cases and guardians are unfortunate necessities, but so are the locks on our doors safeguards to guarantee the continued value of objects within. It is the duty of all concerned with the industrial arts, but especially of those engaged in their manufacture and sale, to acquaint themselves with and make constant use of every facility which may improve American design, and the museum collection is the foremost of these facilities at the present time. Furthermore, the museum is bound to remain the foremost of these facilities for the reason that without its resources even the schools cannot perform.

Hitherto manufacturers have rarely seen the value of taste as an asset; they have regarded their factory merely as a business venture, not as a workbench of national taste. They have not realized that every chair or lighting fixture or tile or yard of goods is a factor in the great mosaic of national culture in the industrial arts. The museum stands ready to help them to a better understanding, not as a patron, not as a big brother, but as a partner in progress. Splendid things have been brought together and made available, lending collections have been prepared, photographs are available, large access may be had to the finest facilities in the way of fundamental inspiration and sympathetic help that ever have been extended to craftsmen and designers and manufacturers. These resources are ready to use, there is no red tape, there is no air of "institutionalism" and awe; there is only the desire to cooperate, to help, for the museum cherishes the highest ideals for the advance of American design. The museum maintains that "good enough" is no slogan for American manufacturers in the industrial arts. The museum maintains that *Made in America* on an object of furniture or furnishings is inadequate unless it also connotes *designed by an American-trained artist.* Above all, the museum has watched the growth of public taste among us, it has seen this taste gradually gain headway and outstrip the design quality of the manufacturer's output, and it has seen many a manufacturer make the discovery that what is easiest to get is not the best.

What will the manufacturer do to assure the progress of America along steady lines of cultural growth? Will he persist in the all-for-business course of quick turnover, or will he bend every effort to achieve the finest design the world has ever seen, because for America only the best is good enough? Like many others whom the course of events has taken aback, the manufacturers had learned that preparedness is the longest word in the dictionary, but it is not too late for him to make a bold effort to profit by the present situation of the United States in the industrial arts. A direct aid is offered him in the Metropolitan Museum. An immediate effort can be and surely must be made to establish Americanism in design, to achieve that new craftsmanship which shall form part of the cultural heritage of the United States. There is no time like the present to take stock of facilities to hand.

THE CRATE CORNER.

The corner of the ordinary crate is its weakest part. With this fact in mind the U. S. Forest Products Laboratory, Madison, Wis., has made a series of tests to develop effective arrangement of members and nailing or bolting. Teachers in manual training will be interested in the findings of the laboratory in that they will be helpful in a study of butt joints.

An example of inexpert crating frequently met with is that shown in figure 1. This construction is poor because the nails holding one member are driven into end grain and so have comparatively low holding power. Another common example of the same fault is shown in figure 2. This construction may be improved (fig. 3) by lengthening the member to permit nailing into the side grain.

The corner construction shown in figure 4 is very weak, because the only nailing possible is through one member into the end grain of the other two. This style of corner is frequently used in crates which are to be entirely covered with sheathing. In a crate without sheathing it would, of course, be worthless.

In figure 5 each member is nailed to another member and has the third member nailed to it. This is a very effective arrangement. It is called the "3-way" corner, and the distinguishing feature is that each member is held by nails or bolts in two directions. Figure 6 is suggestive of further variations of the 3-way principle, with the members notched together.

Seldom if ever does the 3-way corner construction increase the volume of the crate. On the contrary it usually reduces the space occupied. When properly nailed or bolted, this type of corner has a considerable bracing effect, although it does not do away with the need for diagonal bracing.

The sixteen possible arrangements of members at a 3-way corner are given in figure 7. It will be seen that

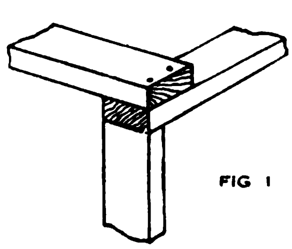


FIG 1

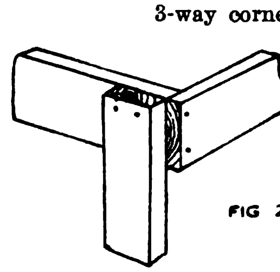


FIG 2

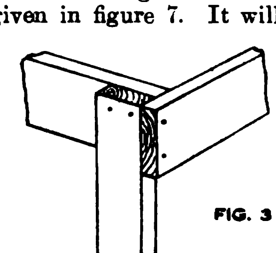


FIG. 3

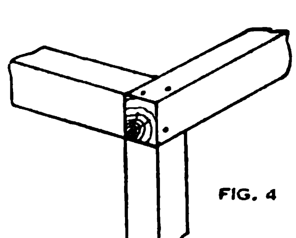


FIG. 4

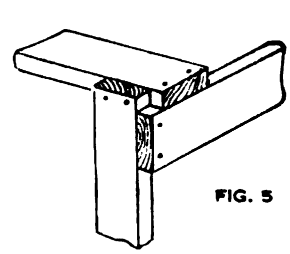


FIG. 5

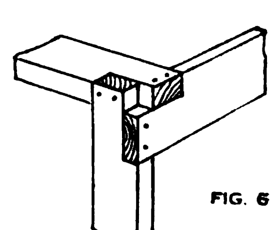


FIG. 6

Figs. 1—6. Types of butt joint construction adapted to crate and box making.

A and 1 are the most practical when the object to be crated is a boxlike form, such as a filing case. When the object is of irregular form, such as an electric motor, one of the other arrangements may have the advantage of permitting better bracing and blocking.

Proper arrangement of members will not in itself produce a good corner. They must be properly fastened together. Whether bolts or nails should be used depends principally on (1) the thickness of the members, (2) the amount of stiffening afforded by sheathing, and (3) labor costs.

other member should not be less than two. Usually as many nails as can be driven without splitting should be used.

Danger of splitting will be reduced if nails are staggered. Boring holes for nails also reduces the danger of splitting.

Bolting.

Bolts have the advantage of holding after the friction grip of the wood on the shank is destroyed. The following schedule of bolt sizes is suggested as a guide:

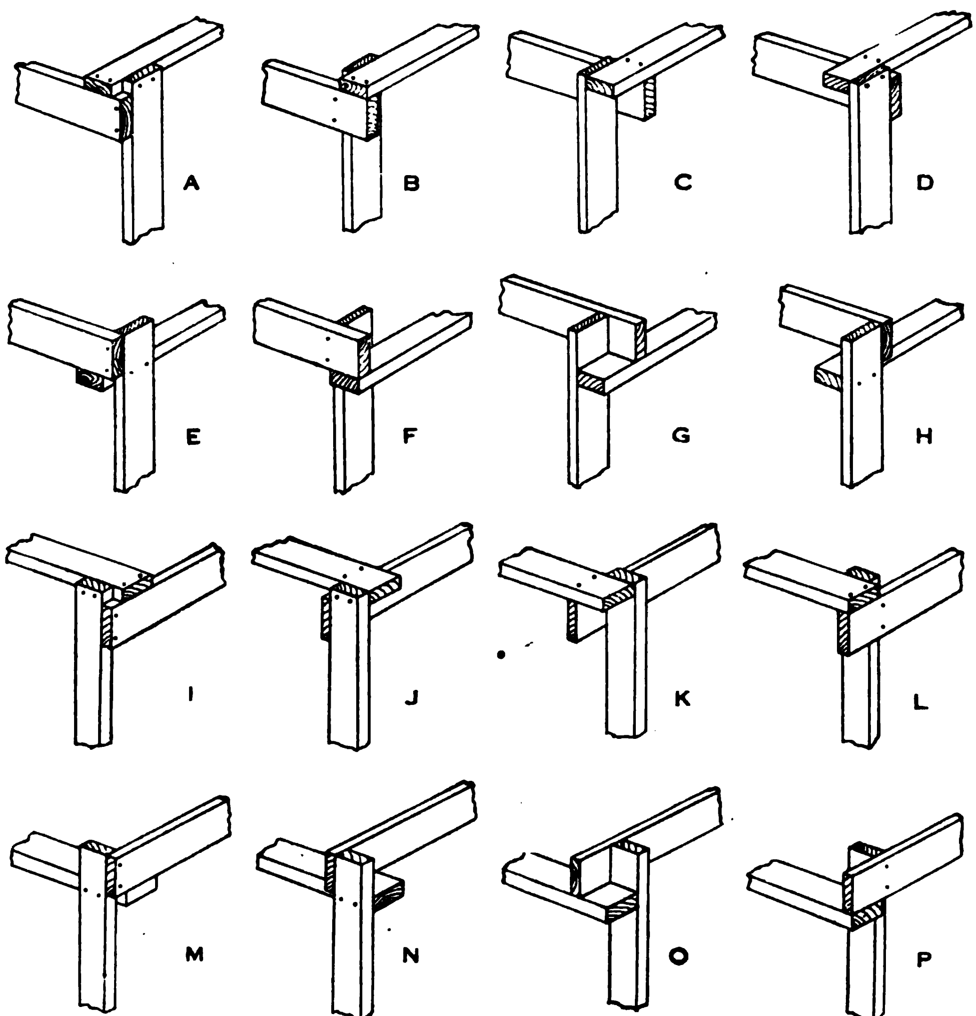


FIG. 7

Fig. 7. Sixteen variations of the butt joint as adapted to crate construction.

Nailing.

Nails driven in holes slightly (1/32 to 1/16 inch) smaller than their diameter have considerably more resistance both to direct pull and to shear than nails driven without holes.

Cement coated nails are superior to uncoated nails.

Length of nails should be somewhat more than twice the thickness of the member holding the heads.

Slender nails are likely to hold better than thick nails under the repeated shocks and constant weaving action to which crates are subjected, because the slender nail bends near the surface of the pieces joined without loosening the friction grip towards the point.

Number of Nails or bolts joining one member to any

Thickness of crate members	Diameter of bolts
Up to 1½ inches	⅜ inches
1½ to 3 inches	[illegible] inch
3 to 5 inches	[illegible] inch

Machine bolts should have washers and the heads should be countersunk.

Carriage bolts are preferred to machine bolts and may be used without washers under their heads.

Nuts should if possible be on the inner side.

Locknuts should be used on all bolts; or, if there is no expectation of using the crate a second time, the threads may be deformed to prevent loosening of nuts.

Holes for bolts should be bored to the same diameter as the bolts—or 1/32 inch smaller.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A MODEL RACING AUTOMOBILE.

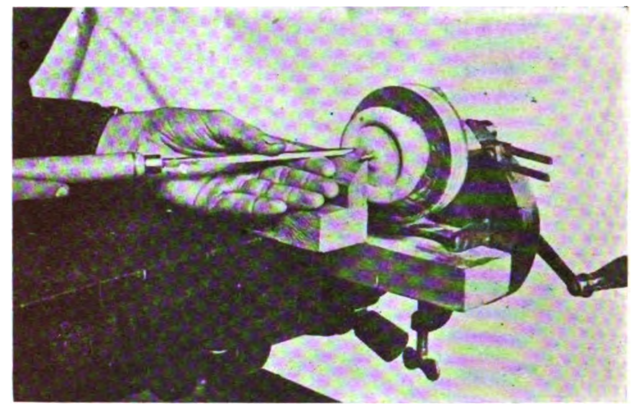
Benjamin Baumritter, New York, N. Y.

Here is a problem, which, like the well known projects of the electrical motor, telegraph outfit, model yacht, etc., gives the boy an opportunity to become familiar with some of the processes in the field of metal work, sheet-iron work, electricity, and wood turning.

At first glance, it might seem that this would be a difficult problem for a class of twenty pupils in a woodworking shop that has no special equipment. It will be, unless every step, every operation is carefully planned and well organized by the teacher from lesson to lesson. With two pair of snips, one soldering iron, one small emery grinder comprising our special equipment, this automobile was constructed, with every boy in the class, busy all the time and perfectly happy.

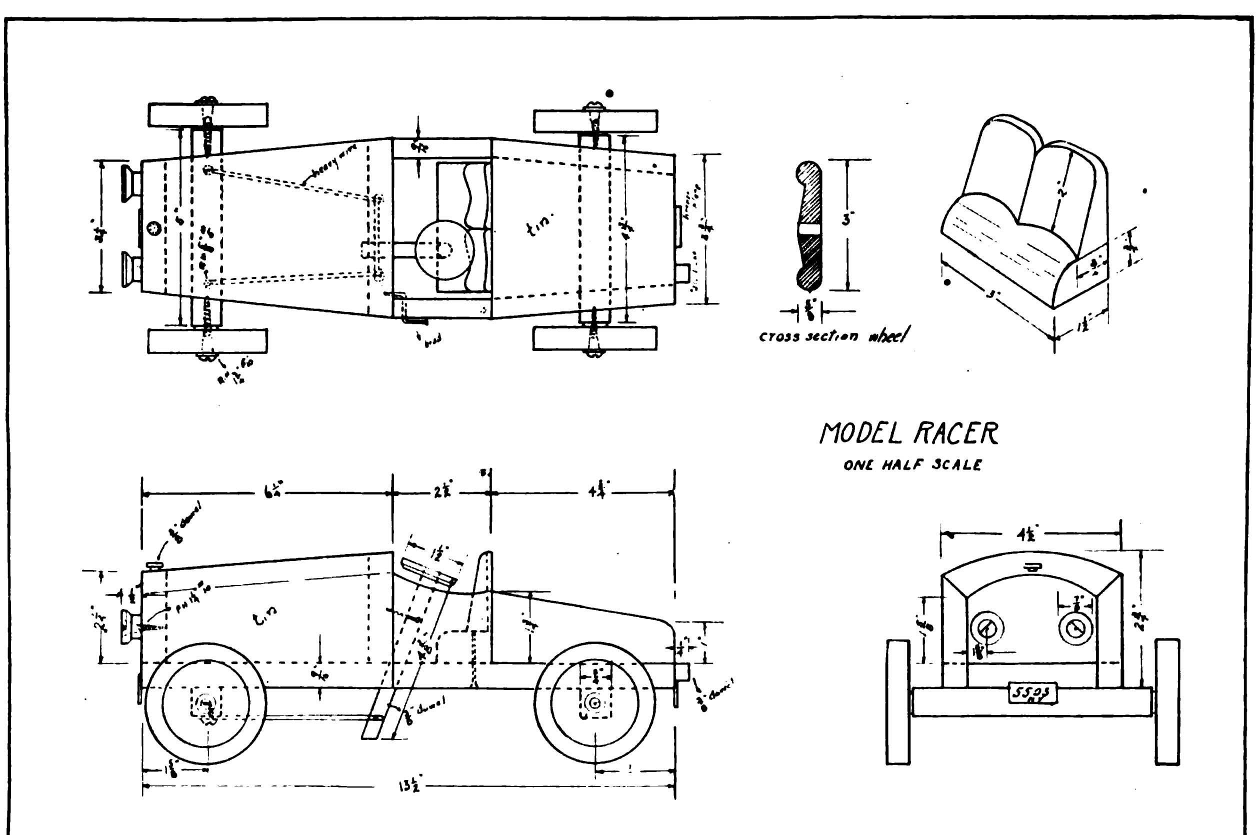
The very first lesson should be a demonstration of preparing the wood and turning out of the wheels. It is a long drawn out operation to make enough wheels for a large class, and therefore must be started at once. The second lesson might be how to prepare the tin cans (olive oil cans, we found, were the best) brought in by the boys for building up the hood and the back. The third lesson, a preparation of the wood parts. And so on.

In the cut it will be seen that the stone of the grinder is replaced by a circular piece of wood fastened by screws to another block of wood with a $1\frac{1}{4}''$ number 10 flat head screw in the center to act as a face plate on which the wheels are turned. A 3/16″ hole is bored in the block intended for the wheel. Before mounting the block should be back sawed as nearly round as possible. The entire jig is set up in the vise, and a tool rest made of two blocks of wood, as shown in the picture. An ordinary $\frac{1}{4}''$ chisel ground down to a round nose shape, may be conveniently used.

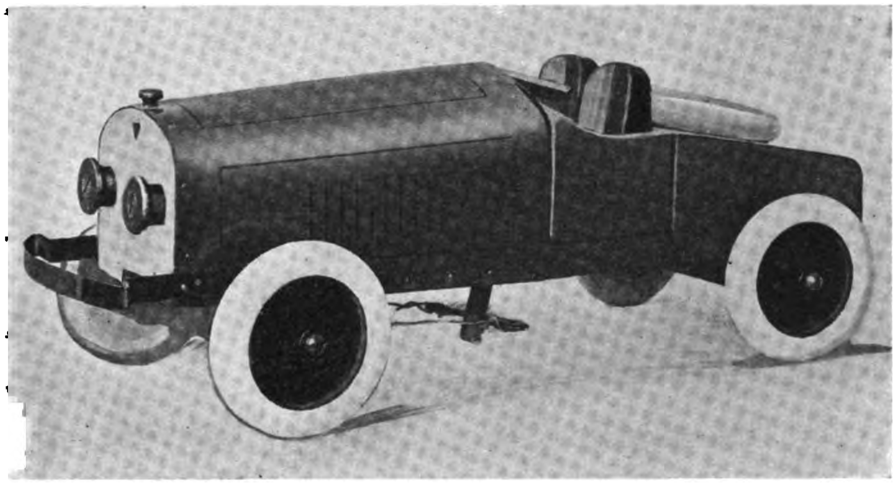


METHOD OF TURNING WHEELS FOR TOYS.

This model has proven to be by far the most popular of all toys, as well as the least expensive. The headlights are the ends of spools, gilded. (Small electric flash-light bulbs controlled by a switch at the steering wheel, makes



DETAILS OF TOY AUTOMOBILE.



TOY AUTOMOBILE MADE IN MR. BAUMRITTER'S CLASS.

a fine problem in electricity, and add a touch of realism to the problem.) The bumpers are also made of tin. And the better and faster workers may equip their automobiles with mud guards and running boards.

The combination of colors on the cars is limitless. It was found practical, however, to limit the boys to three colors only. One color for the seating space, one for the body proper, and one for the disc wheels. The tires are painted grayish white. One coat of under-coater and one coat of enamel were found to be sufficient. The lines on the hood are optional and may be put on with a pen and ruler and black India ink. The license plate number is done with pen and India ink.

The cost to each boy for washers and paint was in the neighborhood of ten cents.

A COOPERATIVE PLAN.

J. A. McKinley, Instructor in Mechanical Drawing and H. Stannard, Instructor in Woodwork, Industrial Arts School, Mount Vernon, N. Y.

This problem is a real piece of furniture, not a problem or an exercise. It was made by an eighth grade boy and we consider it a fine example of cooperation between the drawing room and the woodworking shop. It is presented as an advanced problem in cabinet making and should not be attempted by students who have not had considerable woodworking experience.

The student's account of the work is as follows:

When I was in Grade seven my brother was in need of a combination desk, wardrobe and bureau. He asked me whether I could make one for him in school and I said yes, I would make one for him. I had a catalog at home that contained illustrations of chifforobes from which we got an idea. I asked the drawing teacher if I could make a drawing of one and he said "Go ahead and make one."

First I made a small sketch on which I marked all the general dimensions. When this was finished I made a half-size drawing. The scale was 6"-1'. The size of the drawing was 4' x 5' 8".

When the drawing was finished I showed it to the shop instructor and he said, "If you buy the lumber you can go ahead and make it."

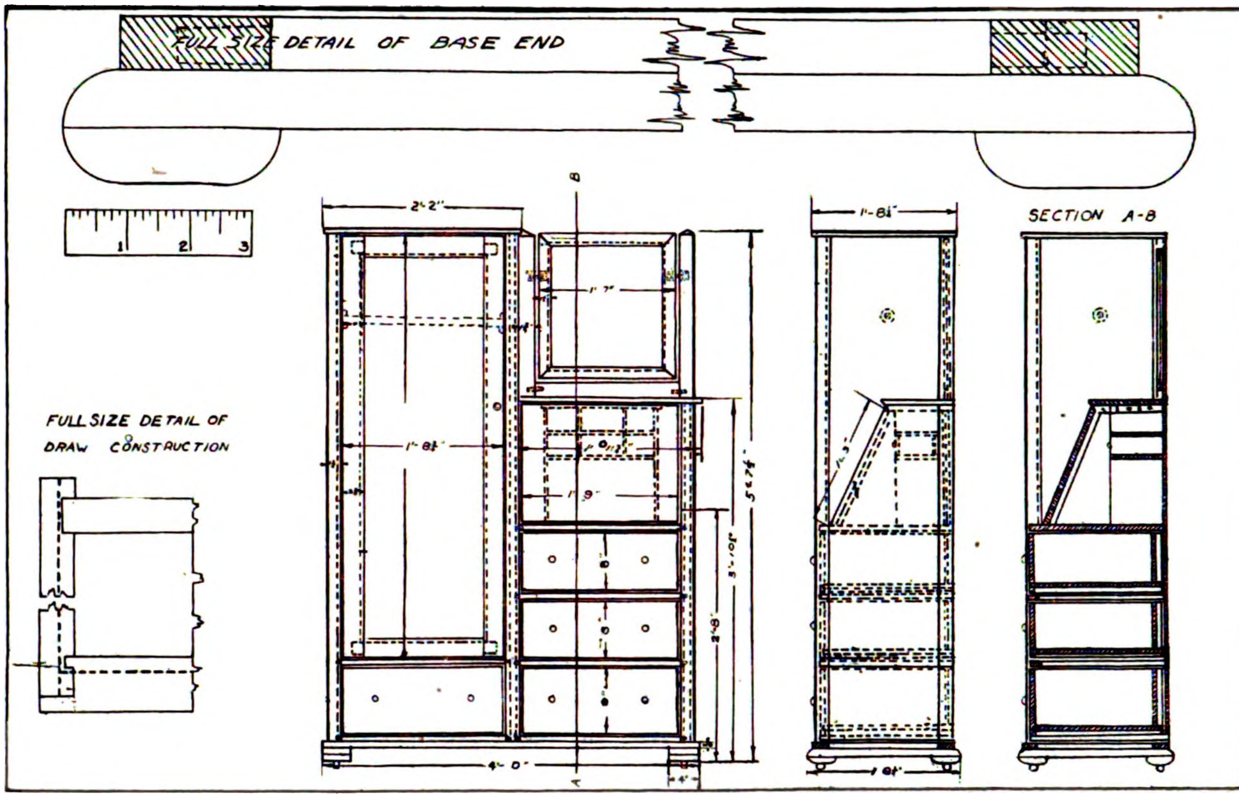
I bought the lumber and started to make it. It took me about three months to make it working only three hours a day. The rest of the day I studied history, arithmetic, English, mechanical drawing and science.

I used two kinds of wood, quartered oak and white-wood. The first thing I did was to glue up the two sides and center sections. Then I glued up the top piece of the wardrobe and the front part of the desk. The top piece of the desk was made next, and the legs and frame for the base and frames for the drawer slides were the last parts made. It was now ready for assembling.

On the side pieces and the center piece I put corner posts which were dadoed $\frac{3}{4}$" wide and $\frac{1}{2}$" deep. The side panels and the center panel were then glued in. Next I put in the cross pieces and made the wardrobe door, using $\frac{1}{2}$" panel and $\frac{7}{8}$" frames. After that I made the drawer fronts of oak and the drawers and pigeon hole partitions of whitewood with oak edges. The mirror frame was made of oak. I bought glass knobs for the drawers and the door, two locks for the wardrobe door, the desk and the drawer, escutcheons for the four drawers, the door and the desk front, and four steel castors.

After the job was assembled, I stained the whole with golden oak stain. To fill up all the pores in the wood I applied filler, after which I gave it three coats of shellac allowing it to set 24 hours between each coat. When the shellac was thoroughly dry, four coats of varnish were applied, allowing it to set 48 hours between each coat. After the varnish had dried I rubbed it down with pumice and oil and waxed it. I then put my glass knob and escutcheons in place and the job was finished.

COMBINATION DESK AND WARDROBE.



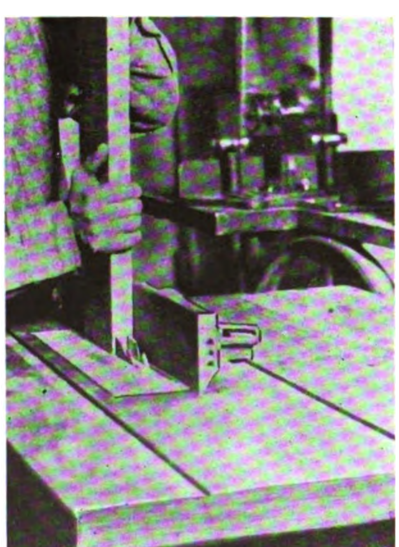
DETAILS OF COMBINATION DESK AND WARDROBE.

A "HOME MADE" TENONER.

Charles Frost, Philipsburg, Mont.

The accompanying photograph shows a tenoning machine, made from a pair of dado saws, with a babbitt metal washer between them on the saw arbor, used on a common circular saw.

The use of this device permits sawing both sides of a tenon at one operation, and with but one adjustment of the ripping fence.



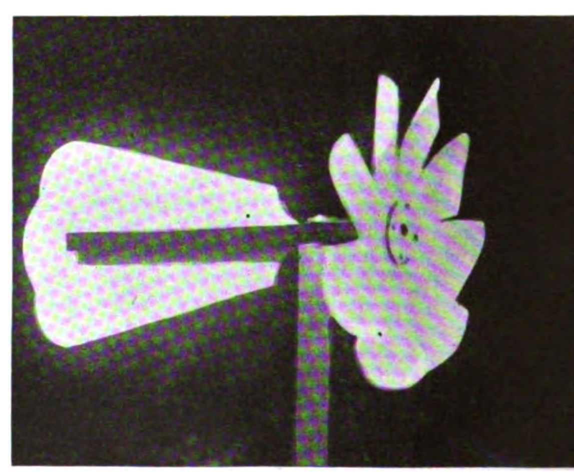
THE TENONER IN USE.

This saves a great deal of labor as most workmen spend more time adjusting their machines than in actually sawing joints when working upon the usual run of manual training and small cabinet problems.

THE WIND WHEEL.

C. E. Newell.

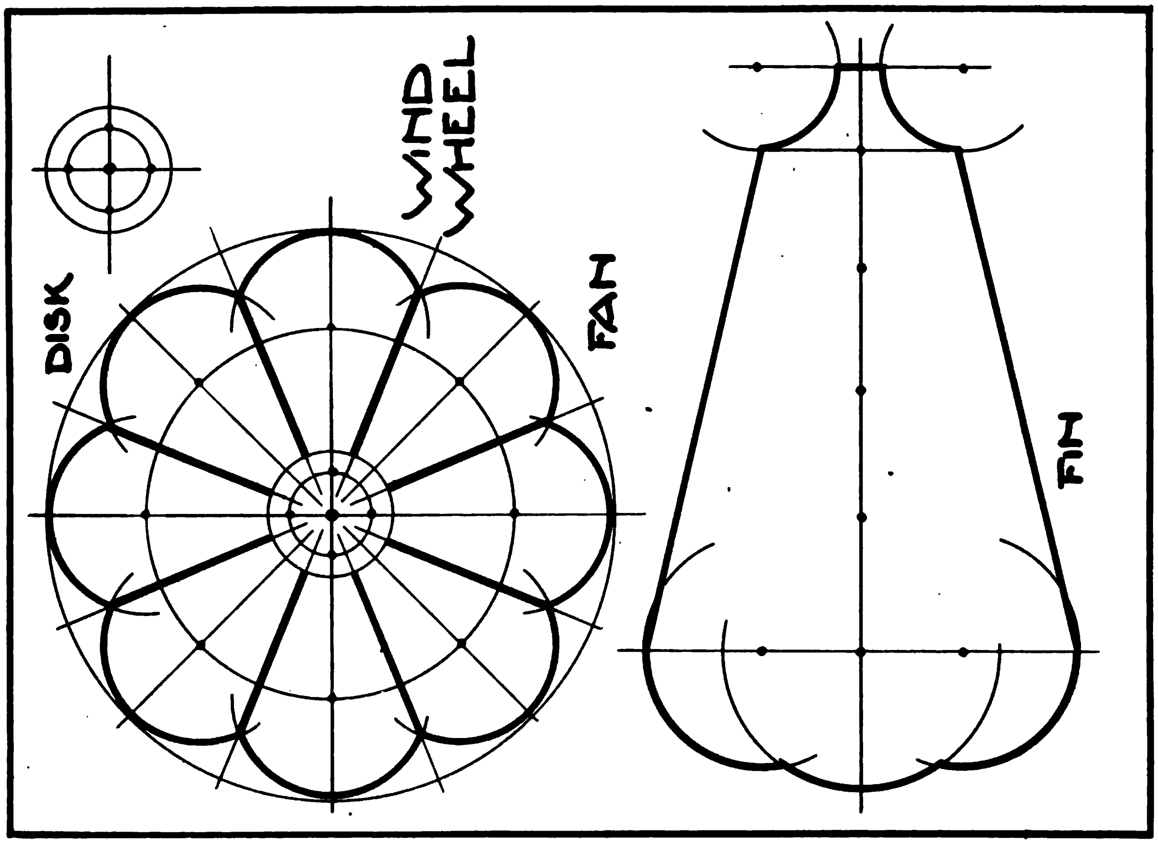
Problems involving the use of thin wood and metal are sometimes skeptically approached by experienced teachers. It is, however, gratifying and reassuring to report that teachers and classes are quite wedded to this type of hand work after once completing such a problem as the making of a wind wheel.



COMPLETED WIND WHEEL.

The following materials are needed for each wind wheel: one soft wood stick ⅞" x ⅞" x 36"; one stick ½" x ½" x 10"; one piece thin metal 7" x 7"; one piece thin metal 5½" x 9"; two iron burrs No. 6; four No. 5 Crown round head paper fasteners; one 1" No. 7 round head blued wood screw; one 1¾" No. 7 round head blued wood screw; five ⅜" No. 20 wire nails; one-eighth sheet No. 1½ sand paper.

The wood may be ordered cut to size or it may be cut in the classroom using the sizes given. Pine, basswood or white-wood may be used. The sticks may be cut from the clear stock selected from boxes, packing cases or crates. The thin metal is best procured from sheets of No. 38 tagger's iron. Sheets of this metal 24" x 38" in



DETAILS OF WIND WHEEL.

size retail for between twenty and thirty cents each. Thin metal cut from discarded tin boxes and cans may be used where the tagger's iron can not be procured. The No. 38 tagger's iron admits of being readily cut with ordinary four inch scissors.

The wind wheel calls for the drawing of two patterns; one for the wheel or fan and one for the tail or fin. By referring to the accompanying plate one may readily draw the patterns using the dimensions as stated.

The Fan: great circle 3½" R; second circle 2⅛" R; third circle ¾" R; small circle ½" R. Use 1⅜" R to divide the great circle into sixteen equal parts and to draw eight arcs at the ends of the diameters. Draw the patterns for two 1½" discs ¾" R; place for punch points ¼" inside the circle.

The Fin: length 9"; greatest width 5½" x 1¾" from one end; second width 2¼" x ⅞" from second end which is ½" wide. Use ⅞" R to describe arcs on narrow end of fin. Use 1¼" R and 1¾" R to describe arcs on wide end of fin. Place four punch points on long diameter of pattern 1½" apart. These points locate places at which to nail fin to ½" x ½" x 10" stick.

Cut the paper patterns ¼" outside the lines and fasten them to the metal by means of patches of paste. Cut the metal to the shape of the fin pattern and sand the edges of the metal. Cut the metal to the shape of the fan pattern by first cutting out the great circle, second cutting the radii of the fan, third cutting the arcs at the ends of the fan sections. Sand the edges of the metal. Cut the two disks from any piece of scrap metal.

Lay the metal pieces on a block of soft wood and punch holes where indicated; five in each disk; five in the fan; five in the fin. A nail or a prick punch will readily make these holes. The hole in the center of the fan and in the center of the 1½" disks are to be made large enough for a No. 7 screw; all other holes must be made small for No. 20 wire nails and No. 5 paper fasteners.

At the center of one end of the 10" stick and at the center of one end of the 36" stick, bore gimlet holes ⅝" deep for No. 7 screws. Through the 10" stick bore a gimlet hole 2" from the end where the first hole was made. Bore gimlet holes through the 36" stick 1" and 4" from one end. These holes are for nailing or screwing the wind wheel to a post, railing or gable end of a building.

To Assemble the Wind Wheel: Reinforce the center of the fan with a 1½" disk on each side. Use four No. 5 paper fasteners in holes punched in the metal. Nail the fin to the 10" stick, 2½" from the end having the gimlet hole, use ⅜" No. 20 nails. Slip a 1" screw through a No. 6 iron burr, through the center of the reinforced fan, through a second burr and turn the screw into the hole in the end of the 10" stick. Slip a 1¾" screw through a burr, through the hole in the ½" stick, through a second burr and turn the screw into the gimlet hole bored in the end of the 36" stick. Allow enough play so that the fan and fin stick will revolve freely on the screws.

Paint the wind wheel using black and one brilliant color of oil paint. When the paint is thoroughly dry, slightly roll the fan sections to make them catch the wind more readily.

Painting and Decoration as a Trade. The Association of Master House Painters and Decorators of the United States and Canada has just issued a pamphlet on the opportunities offered in painting and decorating as a trade. The pamphlet has been prepared by Mr. A. T. McGhan and takes up in detail, in language which boys can understand, the value of a trade as an occupation, the elements to be considered in the selection of a trade and the opportunities of the painting and decorating trade. The economic importance of painting and decorating, the lines of work open in the special branches of the trade are carefully discussed. The suggestion is made that there are large opportunities for becoming master painters. The art side of the trade is described as giving peculiar and personal satisfaction, as well as being of considerable financial value.

The booklet is fully illustrated and will be sent without cost to school authorities who desire copies for their personal use or for general distribution for prospective students in their painting departments. Inquiries may be addressed to the International Association of Master House Painters and Decorators, Washington, D. C.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Moisture Proof Glue for Cabinet Work.

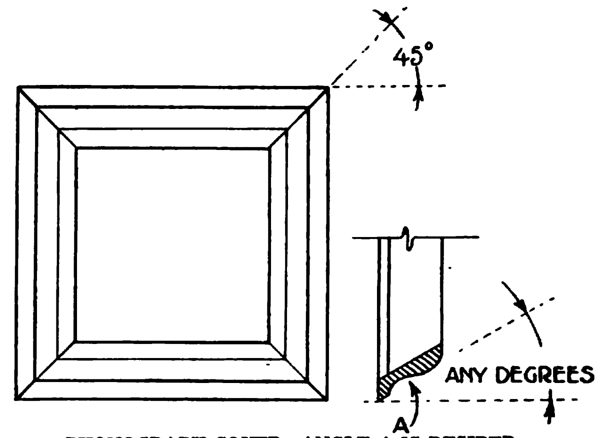
218. Q:—Please inform me as to the best way to make glue harden that is moistureproof. There is so much humidity in the air down here, that glue articles will not stay "stuck." I have been told that bichromate of potash, put in glue at time of gluing, is the right material. Are there other ways of waterproofing glue?—H. D. M.

A:—Soak up 55 oz. of Peter Cooper's cabinet makers' glue in twice its bulk of cold water until the glue shall have become soft but still retains its original shape. Pour off the excess water and bring to the temperature of boiling water in some form of double cooker. Avoid the use of dry heat or direct contact with the flame and glue pot. When entirely melted add 40 oz. of potassium dichromate which has been melted in a little boiling water and as soon as this has become dissolved or absorbed by the glue add 5 oz. of alum. I have used this on cypress for boat work and deck work and find it very satisfactory.

Another formula which I sometimes use consists in the addition of 1 part of raw linseed oil to 8 parts of hot glue stock, cooking for one-half hour with frequent stirring with addition of one-half ounce of nitric acid, dilute, per pound of dry glue used. This will prevent the souring or fermentation of the glue by mold.—Ralph G. Waring.

Cutting Angles.

221. Q:—In constructing phonograph cases I have had considerable trouble cutting the angle of the above drawing. If you can give any information concerning the cutting of this angle placed at any degree between vertical and horizontal, I will greatly appreciate the help.



PHONOGRAPH COVER—ANGLE A IS DESIRED.

A:—The accompanying drawings illustrate the method of solving this problem. No. 1 is the practical method adapted to shop use. No. 2 is a crude mathematical method for solving the angle.—George Ellison.

Large Exhibit Held. The largest exhibit of the manual training department at Clarksville, Tenn., was that held this year. Over two hundred different pieces were shown, ranging from footstools and taborets to buffets, cabinets, library tables, tea wagons and chifforobes. Two thousand feet of lumber was used at a cost of between $400 and $500. The total value of the exhibit is placed at $1,800 to $2,000.

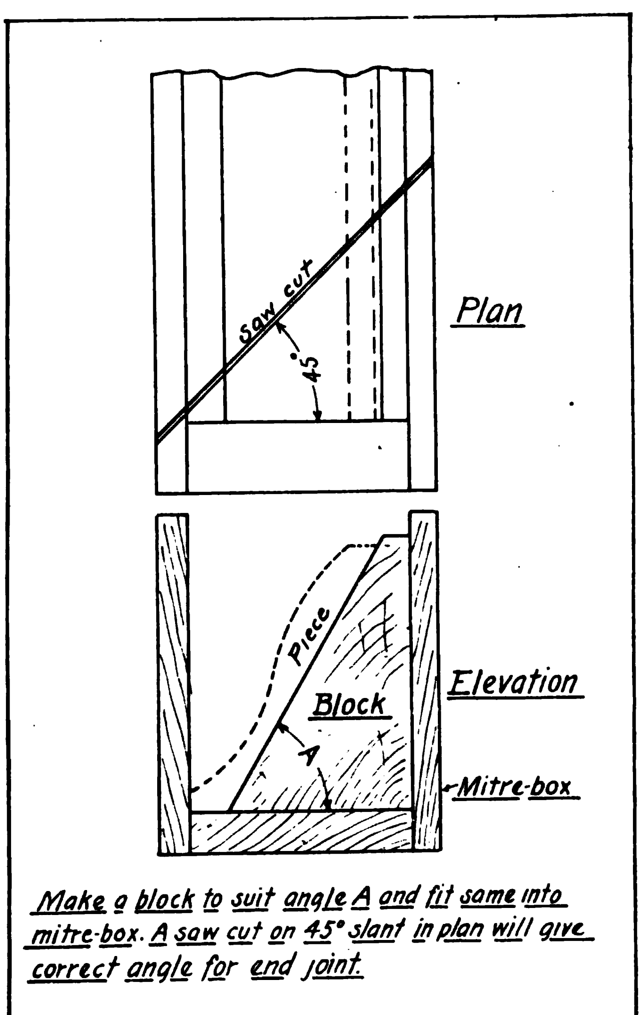


FIG. 1. PRACTICAL METHOD OF CUTTING ANGLE.

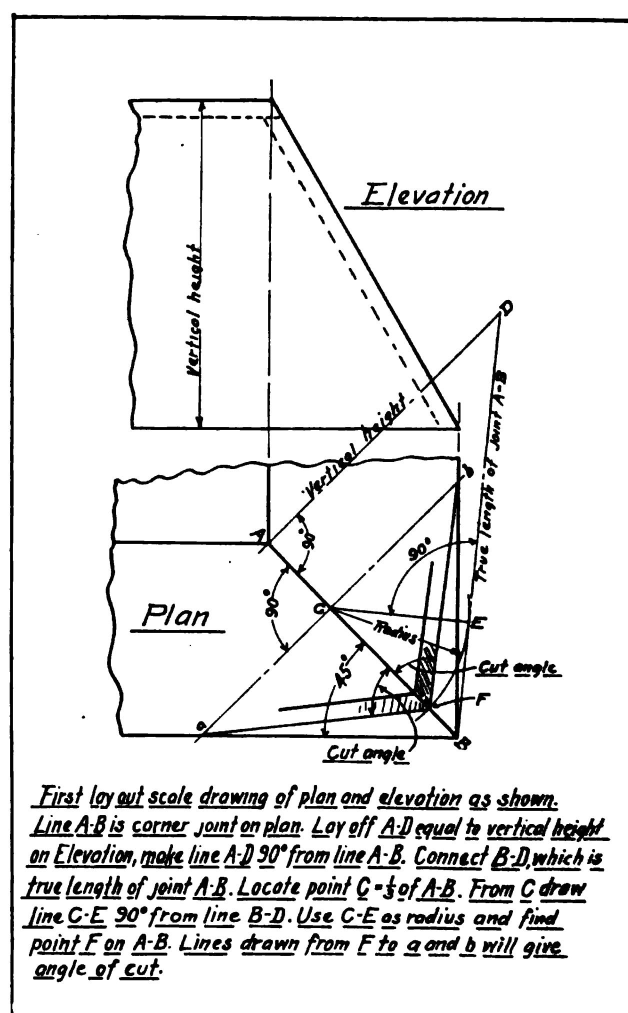
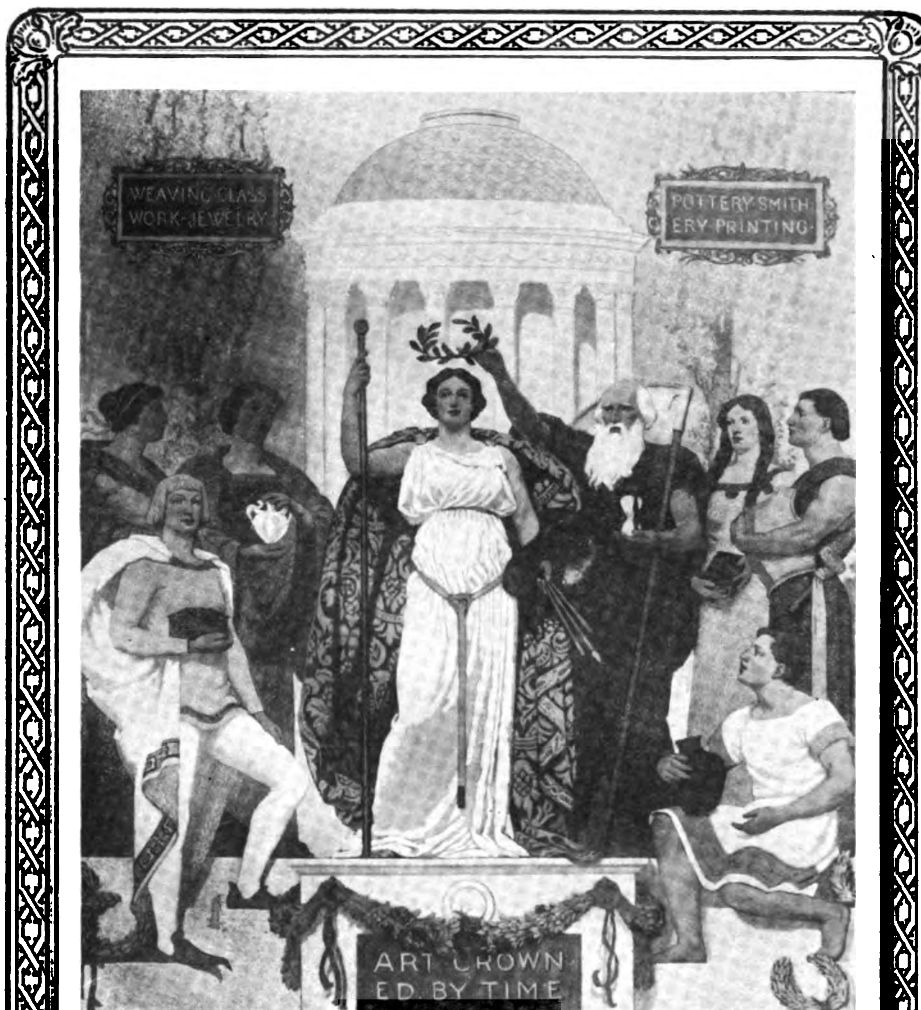


FIG. 2. MATHEMATICAL METHOD OF FINDING ANGLE WITH STEEL SQUARE.

The INDUSTRIAL-ARTS MAGAZINE



SEPTEMBER
1921

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EDITORIAL CONTRIBUTIONS

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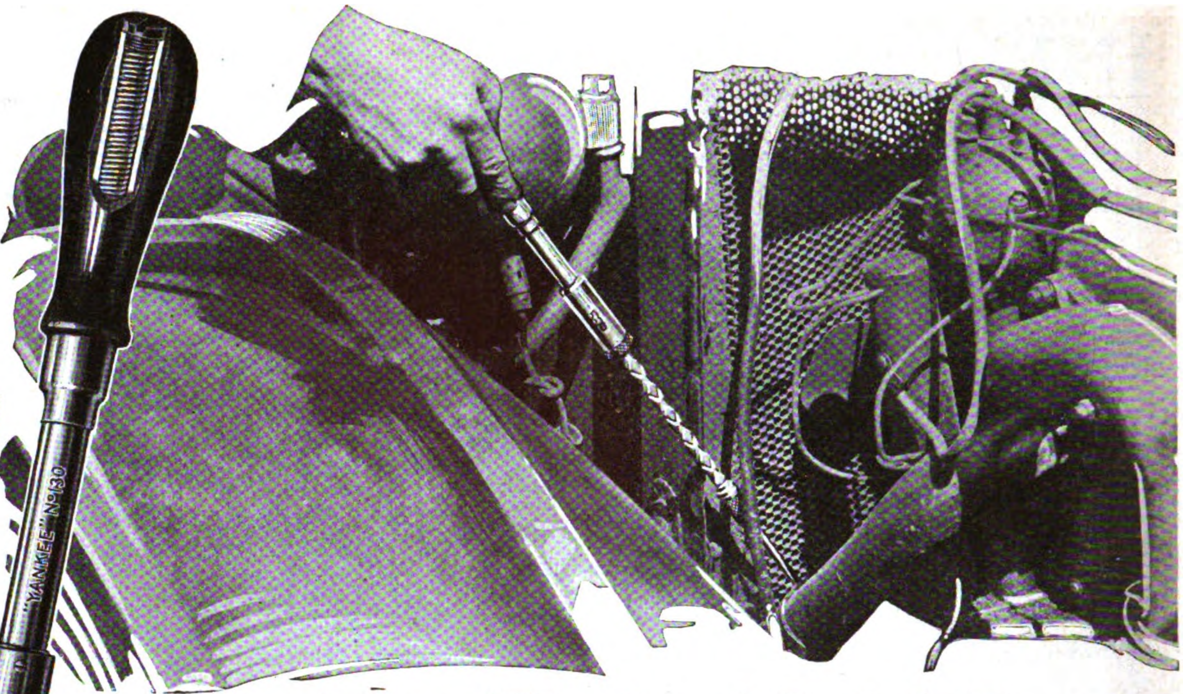


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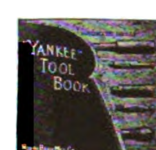

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INDUSTRIAL-ARTS MAGAZINE

Volume X SEPTEMBER, 1921 Number 9

Outstanding Administrative Problems In Part-Time Education

Prof. D. J. Mac Donald, University of Cincinnati

IT should not seem strange that this new field of educational endeavor has brought with it a new and distinct group of administrative problems. How could it well be otherwise when the type of pupils is inevitably so different? Moreover, does not the employer of the pupil somehow have to be considered in every plan of organization? Finally, can one easily escape the conviction that the subject-matter which more or less satisfactorily meets the needs of the full-time pupil will not satisfy the requirements of the part-time pupil, the one who is employed the greater part of his time. These and many other similar queries were doubtless raised and theoretically answered,—at least by a few, prior to the establishment of part-time education laws. But even so, the recent enactment by twenty or more states of such laws, proved to be a veritable Pandora experience for the majority of school administrators. Naturally, they turned for assistance to such states as Wisconsin, Indiana, Massachusetts, New York, etc., where similar laws had been in existence for a short term of years. But it so happened that their needs could only partially be met through the experience of others, with the result that they were forced to rely largely upon the most primitive, yet the most effective even though expensive method of learning, that of trial and error.

The succeeding paragraphs indicate in detail the outstanding difficulties which administrators in part-time education are battling with and the conclusions, however tentative they may be, already reached by some leading administrators. Such facts as are here offered were gained from what are believed to be entirely reliable sources. As to what constitutes the chief administrative problems, this was ascertained by means of one hundred fifty letters sent to as many administrators in California, Indiana, New Jersey, New York, Pennsylvania, and Wisconsin, all of which states, with the exception of California and New York, had experimented with part-time education for several years. The replies of slightly more than one-third, all who responded, are tabulated below. It is assumed for present purposes that the number of times a problem was mentioned is indicative of its relative importance.

Problems	Times Mentioned
Finding suitable subject-matter	28
Securing competent teachers	21
Gaining the cooperation of parents and employers	20
Providing adequate and suitable rooms	14
Getting the pupils to cooperate fully	11
Maintaining regular attendance	10
Financing the new work	10
Arranging satisfactory programs	8
Providing suitable equipment	6

Some Basic Facts of General Application.

Before proceeding to a detailed treatment of each of these problems, it may be well to call attention to some facts which bear vitally upon the administration of part-time education. The first of these is that the extent to which part-time education will flourish in any locality will depend upon several factors, chief among them being the degree to which the existing high school courses meet the civic and vocational needs of youth of part-time compulsory age. The second is that the average mental age of the part-time group will be considerably below that of full-time pupils of the same chronological age. The degree or extent of this difference will doubtless vary with different localities. Thus the difference would be greater in a predominantly industrial center where, due to economic pressure or other causes, pupils enter the working class at as early an age as possible, than in a place where due to the presence of greater wealth all pupils may attend school beyond the compulsory age.

Authority for this statement is found in figures gathered and interpreted by the Vocational Bureau of the Cincinnati Public Schools. To arrive at a basis for comparison, equal numbers of young persons from the working group and the school group respectively, were given the same mental tests. The medians obtained, on the basis of 100, were 62 for the school group and 43 for the working group. The third is that the amount of school training possessed by part-time pupils will be obviously less than by pupils of the same age

who remain in school. Let this not blind us to the fact, however, that in many instances the practical training gained in commercial and industrial life may be more conducive to mental development than attendance upon school classes. Authority for the above statement is also gained from the Vocational Bureau of the Cincinnati Public Schools. It must be remembered that these figures represent only those who passed through the school employment office in 1919-1920, all told 2,868 of both sexes, the boys' ages being 15-16, the girls', 16-18. One may safely assume that a substantial number of 15-year-old boys who completed the sixth grade and of 16-year-old girls who completed the seventh grade, are not included because they continued in school—this would be especially true of the boys—or because they remained at home after meeting the school attendance requirements. This latter condition would prevail to a considerable extent among the girls.

Time of leaving school—	Per Cent
Before completing 5th grade	2.0%
Upon completing 5th grade	4.7%
Upon completing 6th grade	11.6%
Upon completing 7th grade	18.9%
Upon completing 8th grade	38.7%
Upon completing 9th grade	12.7%
Upon completing 10th grade	9.6%
After completing part of 11th and 12th grades	1.8%

Finding Suitable Subject-Matter.

Whether or not it is true, as one experienced part-time administrator maintains, that "Ultimately the part-time vocational classes must become as varied in subject-matter taught and in supplementary equipment maintained as the commerce, and the trades and industries of the communities in which these classes are conducted," the fact remains that here is found one of the most perplexing of all administrative problems. As for the reason, suffice it to suggest at this time that it may be due largely to the fact that our teachers are trained primarily to use textbooks rather than their heads. The natural result is that when they move into a field where no suitable texts are found, they are at a loss as to how to proceed.

A glance at the following significant characteristics of part-time pupils will shed some light not only upon why it is hard to secure suitable subject-matter but as well upon why satisfactory teachers cannot easily be trained. Their mental age ranges all the way from ten or less to sixteen or more years. Their academic preparation varies from below fifth grade standing to all but graduation from high school. They were for the most part glad enough to leave the full-time school when the law permitted. They not only have little interest in general education but with few exceptions could not pursue it with profit. Because of the very nature of circumstances they must have largely accepted the skeptical attitude towards schools which prevails in business circles. And when there is added to these the statement that fully one-half of such pupils especially in industrial centers, are in jobs for which little or no previous training is necessary and finally the fact that pupils will be entering and leaving classes almost daily, —at least this would be true in the large centers—one has little difficulty in seeing why the regularly trained teacher and the average administrator cannot ordinarily "fill the bill." For this, of all times, is the time when conventional methods, subject-matter and programs are sadly out of place.

How easy it is to state that so far as possible the subject matter of the various courses should correlate closely with the respective occupations of the pupils; but how extremely hard to know what to put into a course when one realizes, (as has just been pointed out,) that possibly one-half of the pupils are working at jobs which have no teachable content. One thing is certain, teachers in this field cannot afford to underestimate the importance of information such as that gained by the war investigating committee, namely, that of 18,000 jobs analyzed, seventy-six per cent were of such nature that they could be mastered in from one hour to one month of time, the average being ten days. Information of this type should be obtained for every locality. No teacher can safely assume that what is true in this respect in another community, is necessarily true for his or her community. (As the writer has said in substance elsewhere (See July number of Educational Review)) Subject-matter should vary in accordance with the occupation of the pupil. The same material cannot be expected, for example, to meet the needs of pupils from a shoe factory, a silk manufacturing plant, a knitting mill, a bank, a tobacco factory, etc., unless it be the material which has to do with the development of civic intelligence.

The close relationship between our problem and the job analysis movement in commerce and industry is obvious, as is also the fact that part-time teachers and administrators may gain great assistance through affiliating closely with the officials who have charge of such job analyses. Apropos to this are the words of Miss Nellie M. Clark, Detroit Part-Time School, "While the part-time teacher can visit places of employment and so far as possible make instruction apply in the work life of the pupil, any satisfactory program of occupational instruction can be carried out only when surveys have been made of various types of skilled occupations open to girls under 18 years of age for the purpose of discovering the knowledge content of such occupations, the qualifications of workers, and of suggesting courses of instruction."

Indicative of the attitude on this point are the following remarks: "The principal responsibility placed upon the schools by a part-time law is that they eliminate all non-essential material from the subjects of instruction, that they give practical courses a large proportion of which should be vocational in nature, that they adjust the instruction to the needs of the individual student, and that they establish and maintain a close relation with the employment world."

"The academic part of the course of study should be entirely different in its method of treatment from

that which the pupils have been accustomed to in their regular school life."

Possibly the results obtained by the writer in an endeavor to ascertain through conferences with both employers and employees the basis for a practical course in Electrical Theory will be of assistance to others in the field. By the term practical as here used is meant a course that would meet the needs of the ordinary electrical worker, the one who left school before completing the eighth grade, has been working at the trade for from five to fifteen years and has had little if any schooling in the meantime. While the major portion of this information was secured through interview and conference with employers who were asked this question, "Will you kindly record specific instances where your employers 'fell down on the job,' as, for example, made this particular mistake, lacked such and such information, etc.?" some of it was gotten through interviewing the more intelligent and energetic employees. The needs of the employees as revealed by the investigation follow:

They need instruction on the theoretical side, including particularly the calculation of conductors, the principles of electric generators and motors, and a comparison of the characteristics of batteries. With this should be embodied the study of circuits as regards electric lighting and powers, also signal systems such as bells, telephones, etc.

They lack pride in their work. They should have drilled into them that the best, and nothing but the best, workmanship should be tolerated and that it is just as easy to make a neat installment as a poor one.

They lack knowledge of the fittings and appliances to be had, this often resulting in the use of an article or fitting that is not the best one for the purpose.

They lack common sense, i. e., the ability to meet a situation that is a little out of the ordinary, in the best possible manner.

They do not give attention to details; they lack imagination; they do not see the project as it will be when completed. The result is that they do not have the proper materials at hand when they are needed.

They lack detailed knowledge of the latest Rules and Regulations of the National Board of Fire Underwriters for Electric Wiring and Apparatus.

They lack knowledge of the local electric company's requirements for placing meter boards and service conduits. Lack of cooperation between the utility and the men is the cause of no end of trouble.

They should have thoroughly instilled into their minds the idea of accuracy. The method of wiring the ordinary single pole, 3-way and 4-way switches should be known to all electricians worthy of the name, but, nevertheless, numerous "come backs" are the result of misconnections. Such errors are due not so much to a lack of knowledge as to sheer carelessness. In this connection a talk on "Testing Finished Work" might not be amiss.

Ability to read blueprints and interpret specifications intelligently would be a valuable asset.

They should possess requisite skill and knowledge of the shortest methods.

They should be ambitious to become efficient workmen.

They do not estimate what material they will run out of and fail to call up before they run entirely out. This often results in enforced idleness while the needed materials are being taken to the job.

Securing Competent Teachers.

Due to the close connection between this and the preceding topic, many of the statements made there have equal application here. Especially is this true of the statements regarding the wide variability, mentally and vocationally, of pupils concerned. These facts alone warrant the assertion by Superintendent Ford of Santa Barbara, California, that "It will take five years to train teachers to meet the new situation. It is an entirely new problem in construction and teachers trained to the ordinary class methods are slow to grasp the necessities of the situation.

When one examines the list of desirable qualifications for part-time teachers he is almost ready to subscribe to the dictum, "There ain't no sech animal." An enumeration of these as expressed by K. G. Smith, State Supervisor of Trades and Industries for Michigan, follows:

1. He must know the problems of the wage earner.
2. He should have earned his living in at least one occupation other than teaching.
3. He should know the occupations represented by the pupils by observation if not by experience.
4. His primary interest should be in pupils rather than in subject-matter.

Obviously one is placing a large responsibility upon a teacher's shoulders when he asks him to become thoroughly familiar with the problems of wage earners, referring, of course, to those under his supervision. To be sure, there are such teachers both actually and potentially. The difficulty is to get them and train them. In ninety cases out of one hundred it is safe to say, the instruction given must be more or less individual in character and each lesson made a unit in itself. The demands upon this type of teacher, so far as daily preparation is concerned, are well enumerated by O. D. Evans, State Director of Continuation Schools, in Pennsylvania, who says, "that each week's work should be planned in advance, that it should be based upon the teacher's accurate knowledge of the environment and opportunities of the pupil in employment and at home, and that instruction from textbooks be reduced to a minimum, the use of reference books and actual experience being preferred at all times to textbooks."

From whatever angle one approaches the problem, he is certain eventually to come face to face with the fact that not only must teachers prepare unit courses but also well-organized unit lessons. Upon this one point there is uniform agreement. Only those conversant with

teachers and the degree to which they depend upon textbooks can truly appreciate the difficulties which administrators face when they try to secure or train candidates who can and will meet this requirement. Fundamentally, the none too common traits of originality, resourcefulness, ability to think a new problem entirely through, a liking for pioneer work, an undying yet healthy interest in adolescents must be present, not to mention the many other desirable qualities. Little wonder is it that certain administrators despair of making substantial progress until a new type of teacher can be trained.

Providing Adequate and Suitable Classrooms.

A review of the various replies reveals a failure on the part of school administrators to distinguish between the narrower problem of sufficient and desirable rooms for classes and the larger one of single or dual administrations, locally speaking. There is an unmistakable leaning among the most experienced in this field towards placing part-time work in one or two rather than in many centers in a school system, all such work to be under a special administrator. Thus, Mr. O. D. Evans, recommends that this work "be centrally located and in one center to the end that numbers may justify variety of instructional opportunity." While Miss Clark of Detroit writes that "The success of the part-time school depends upon its being a separate organization in the school system. If fitting it into a full-time school organization is attempted, it will be crowded to the wall, its problems made incidental and its schedule sacrificed. The basis for classification in a part-time school is no narrow adherence to educational attainment according to grade."

Another authority, Mr. R. L. Cooley of Milwaukee, strongly "favors centralizing part-time activities, recognizing that a part-time school can only at best be a supplementary school."

Another factor which must not be neglected in this connection is whether or not separate classes should be conducted for boys and girls. Here again there is difference of opinion, though the weight of evidence is unmistakably on the side of separate classes. Commercial work, it seems, is recognized as an exception to the rule. Just how the plan of segregating the sexes, however desirable and however feasible it may be in the larger centers, can be effectively carried out in the smaller centers is not at all clear to the writer. He is inclined to the belief that the increased cost entailed thereby might make such an arrangement prohibitive. He recognizes at the same time, however, that much would depend upon the manner in which the program is arranged.

A question which has come in for considerable discussion, especially during the past two or three years, is in regard to the advisability of holding part-time classes in classrooms provided by employers. Wide difference of opinion prevails, so much so, in fact, that it is difficult to reconcile the remarks of some with their expressed beliefs regarding the necessity of centralized classrooms. The question at issue is not, it seems, so much that of possible divided authority as of the general morale of the pupils and a desirable environment in which to raise this to the desired level. Whether or not this is a well founded contention, time alone will tell. Suffice it to say that to an interested and critical observer who has seen much of both types of classes, the evidence is overwhelmingly in favor of the school, as contrasted with the shop classroom. The possibility of creating an environment in a shop which is conducive to the development of those more or less indefinable, yet extremely essential, spiritual components of good citizenship, is conceivable; but the same cannot be said of the probability. And when all is said and done, civic intelligence, according to the testimony, is one of the most important objectives in part-time education. The extent to which this is, or shall be true will, of course not be known until the possibilities for providing specific vocational training for various juvenile occupations is ascertained by means of exhaustive analyses of such occupations. It now looks as though a substantial per centage—perhaps even one-half or more—of the occupations of juvenile workers have little, if any, distinctly vocational content. If time should prove the truth of this statement then it goes without saying that the conditions under which part-time classes may be held to advantage will be partially determined thereby.

Getting Pupil Cooperation.

Again and again in the responses the assertion was either directly made or implied that to secure regular attendance from part-time pupils is beyond the range of possibilities. While some school administrators blamed the parents for this state of affairs, others the employers, and still others the pupils themselves, a few were honest enough to admit that possibly the bad taste left in the mouth of the pupil when he was in full-time school, supplemented by the unfavorable daily reports he is getting from his relatives and friends who are still of the compulsory age were playing a prominent part in promoting a spirit of non-cooperation.

Lack of space forbids an analysis of these possible causes. The writer has a feeling that the correspondent who warmly protests against continuing to "picture the part-time school as a nest of young birds greedily opening wide their mouths to devour the worms of wisdom dropped by the teacher" is not far wrong. There will always be a substantial number of young persons who will resent any kind of supervision regardless of its intent or nature. A fifty-fifty arrangement from such as these cannot be expected. They know (?) too much to enable them to be good listeners. They believe that they are qualified to give out rather than to receive information. As a consequence their most vulnerable point is the source of income. This is equivalent to saying, in other words, that if the cooperation of the employers can be gained, the battle is won, provided, of course, other factors involved in the way of suitable sub-

ject matter, a satisfactory program, good teaching, etc., are up to standard. Needless to say, this much-to-be-desired cooperation of the employer cannot be gained through merely asking for it. There are plenty of cases on record where not merely one year but five or even more years were necessary for leading employers to see the advisability of keeping their employees constantly growing. Not only must the campaign be well planned but it must be very skillfully executed if employers, the seeming key to the situation, are to be won over. Normally, these men are decidedly "from Missouri" whenever the schools propose anything. As a consequence they must be shown, not once, but over and over again, the value of such work to them. As one writer puts it, "If we have nothing to give his employees, he will rebel; but if we prove that his employees are better because of us, or that we have helped to solve some of his problems, even the rebellious ones will in time tolerate us." He might well have added "welcome us."

The writer is familiar with conditions in one city where developments have taken place to such an extent that not only do factory officials in normal industrial times ask the coordinator to place boys with them but they have at times earnestly sought information regarding how to secure and retain part-time pupils in their employ. In this same city, it is worth recording, it is not unusual in normal times for the boy of part-time school age to discriminate against employers who will not permit him to attend school four hours per week. (Lest the wrong impression be gathered from the above statement, I add that in this instance pupils are paid for attending school whether it be for four hours per week or for alternate weeks, the weekly wage in the latter case being spread over two weeks.)

The following statements provide a fitting conclusion to this topic, the first being from Mr. Frank M. Leavitt, Assistant Superintendent of Schools, Pittsburgh, Pa. "Of very great importance is the matter of establishing friendly and intelligent relations with the employers of the juvenile workers. This can be done partly through the administrative offices of the continuation school itself but an important adjunct is the vocational guidance and placement office which is maintained in the continuation school building."

The second from Miss Agnes Wolcott, Director of Part-Time Education, Long Beach, California, shows how, in order to create a cooperative interest on the part of employers, parents, part-time minors, in fact everyone, "They formed a citizens' committee consisting of employers, employees and others interested, including newspaper men, to act as an advisory body and likewise as a publicity committee. The employers are represented in part by the Chamber of Commerce and the employees by the Labor Union Council." The third, which by the way brings out one of the points vital to the successful administration of part-time school work, comes from Mr. M. J. Michael, Superintendent of Schools, Kingston, N. J. "One of the most important results comes from the followup work. Our vocational director spends each afternoon visiting the different employers of the members of the part-time school, keeping himself posted with reference to the character of the work they are doing and the effect the school is having on the employee."

Arranging a Satisfactory Program.

The task of arranging a satisfactory school program is complicated enough under ordinary circumstances. But when a third party must be reckoned with, the employer, administrators in both fields agree that the task becomes very much more difficult. Picture a situation like the following—one, by the way, which is not at all unusual—one group of employers swayed by a few who are antagonistic to the part-time movement maintain that they cannot afford to let their juvenile employees off in the forenoon, another group takes the position that since some of their young workers are attending evening classes it is possible for the rest to do the same, while still another group insists upon getting rid of all employees who fall within the compulsory age limit. Increase the number of such possibilities at will—to do so would be no exaggeration of conditions in many cases—and the magnitude of the task of arranging and maintaining a satisfactory school program will begin to loom up. Nor has the important factor of continuous enrollment and dismissal of candidates been duly considered in this connection. All these and other factors, it is pointed out by numerous administrators, cause the program-making task to be exceedingly trying.

What some of the other factors are is indicated in the following statement by two prominent state officials: "Every part-time teacher should be required to devote at least one-fourth as much time to visitation, placement and followup work as to actual teaching."

"The teacher's weekly program involves from 24 to 30 clock hours of followup or coordinating work."

How the task is complicated by reason of the employer is indicated by the following: "We attempted," says the superintendent of schools at Alameda, California, "to avoid Saturday afternoon classes but were unable to since it would have cost more than 40 pupils their jobs." Mr. C. L. Carlsen of San Francisco writes that he can get employees into class in the face of opposition if the classes are conducted near the place of employment. The convenience of the employer must be the first consideration."

In order to obviate in part the task imposed by reason of new ones constantly enrolling and others weekly if not daily satisfying the requirements and dropping out, some administrators have arranged for a so-called "reservoir" classes into which all entering pupils are placed until classified. It is manifest that providing for such a class in the program would complicate matters still further. But despite all of these objectionable points part-time programs are being made and remade until they eventually approach, if not attain, perfection. It seems to be a case of "Where there's a will there's a way."

In conclusion the writer wishes to quote by way of

summary from the remarks of a businessman what he considers a fair epitome of all the responses received. For in the last analysis the path of the public schools, because of the necessarily closer affiliation with the laboratory of experience occasioned by the establishment of part-time classes, will be far less primrose in character than has been the case heretofore. As someone has well said the test of industry, namely, "put out or be put out" will be increasingly applied as vocational education development takes place. This businessman's statement is: "Do you realize that you are selling education? Do you dare defend its quality as the manufacturer of an automobile will defend his product? You have not had to, but you will not always enjoy this immunity." "Is the taxpayer satisfied? Nearly one-half of the taxes he now pays are for the support and maintenance of education." (This was in an eastern state.) "Will he pay more? Not without protest if the quality remains the same. Change the quality, show the taxpayer that you propose to give him better educational value in exchange for his money, and he will not only pay the bill but will thank you for the opportunity to do so. How do I know? Because I have sold goods and I know how buyers respond to what they want. Why are we paying machinists $60.00 to $80.00 a week and increasing the salaries of teachers only a beggarly $100 or $200 a year? Why, because the public has no confidence in education as an essential industry." (This statement was made in the year 1917.) "Of course the educator does not want to admit it, but the fact is the public, or those who act for it, doubt if the returns received on the educational investment are worth the cost, and to no small degree the public is right."

"When you have thought out an educational policy that is right, that you know is right, and that you can defend against all comers, state it in terms of a program of action that the ordinary citizen can comprehend and then advertise it. Advertise it to those very people who are your prime consideration, create a public demand for your educational commodity, furnish a brand that bears out your advertising, and the public will accept it and pay for it."

The writer cannot but feel that somehow these unvarnished facts are peculiarly significant for administrators and teachers in the part-time field. More than that, he is of the opinion that if part-time school work is reasonably well done it will prove to be the greatest stimulus to general education that it has had for years. Need the inference be pointed out, that if school administrators wish to make their problems of finance easier of solution, they will do well to see that their schools are "sold" to the businessman by and through the quality of product turned out in the chief means of contact, the part-time school?

A Model Steam Engine as a Shop Project

Edward L. Moeser, Instructor in Machine Shop Practice, Depew High School, Buffalo, N. Y.

THE steam engine described below was designed and built for two reasons: First, it was used as a class project in a school located near the main shops of one of our large railroad systems. Ninety per cent of the graduates will find their way into these shops. Obviously, the more these boys know about steam engines the more rapid will be their advancement. Second, the building of the engine afforded a wide variety of work and an opportunity of proving that "Necessity is the mother of invention."

Our shop equipment consisted of an eleven inch lathe and a twenty inch drill press; a power driven emery wheel and a bench with six vises. Other necessary equipments such as drills, reamers, files, chisels, etc., completed our list of tools. We had no shaper, no milling machine, no power hack saw, etc., so that opportunities for demonstrating the uses of the lathe and the necessity of doing lathe work on the drill press were very numerous.

The boys who worked on these engines were all in their second year. Their first year had been spent in carpentry, cabinet making, wood turning and mechanical drawing.

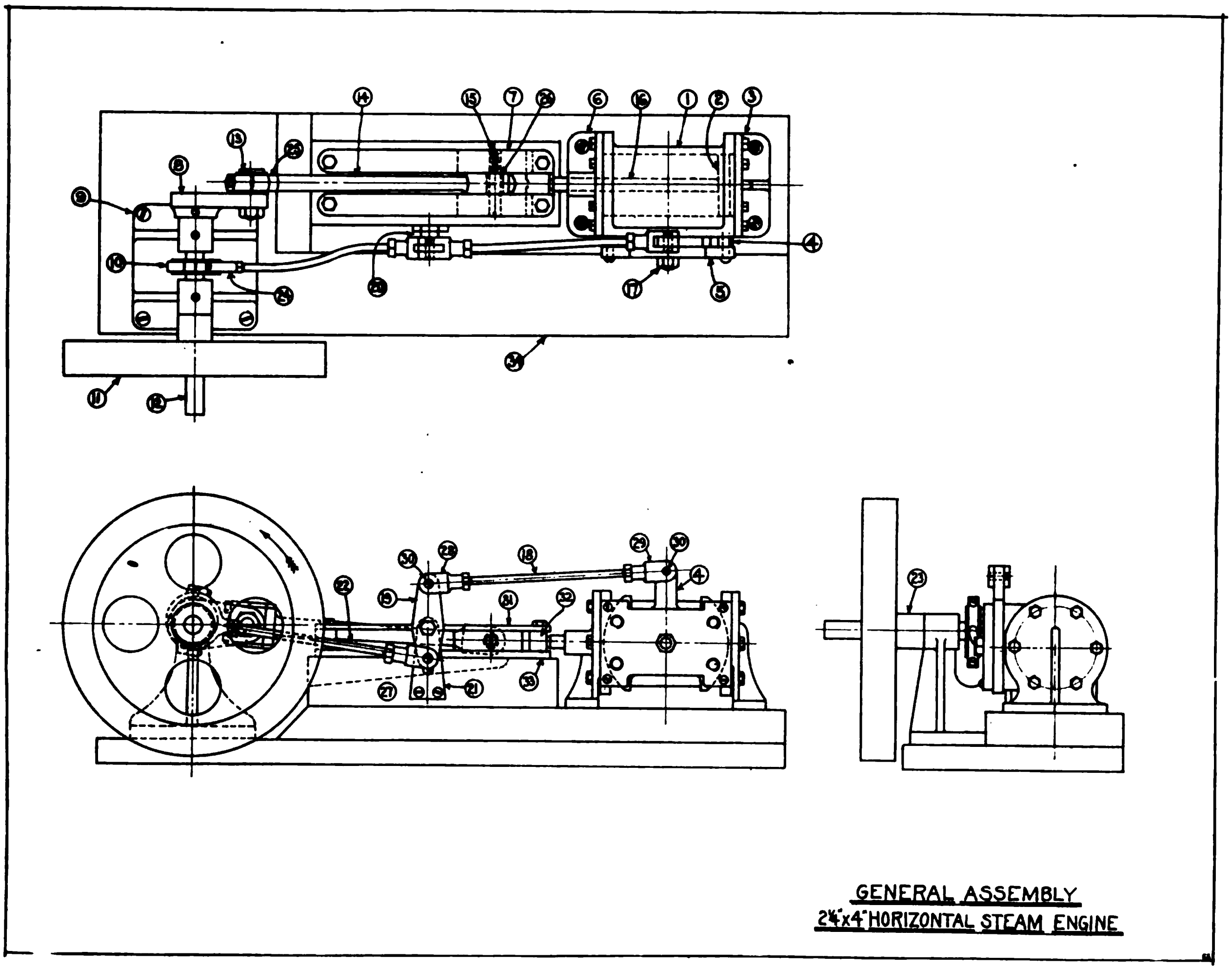
In machining the different parts of the engine no attempt was made to follow any rule for finishing one part after another as necessity required. In turn each boy was assigned a half day at the lathe, about every ten days. To illustrate, each of the ten boys in the class had a number. Thus, when No. 1 had had his half day at the lathe, No. 2 would follow and then No. 3 until each of the ten engine builders had had his half day. Then No. 1 would again have his turn. While the lathe and drill were busy the other boys worked at the bench.

In the following paragraphs I shall not attempt to say which part or parts were finished first, but to explain how each part was finished, naming each operation in its proper sequence.

The Cylinder.

The cylinder of the engine could have been bored on the lathe or on the drill press. The lathe was so small, however, that we decided to bore it on the drill press. This method was also more advisable, because a much better finish could be obtained, and an opportunity was given for the use of some tools which today are seldom thought of or used in the machine shops.

Fig. 3 illustrates how the cylinder was bored on the drill press. A boring bar was used for roughing out. A bushing was inserted in the drill press table to



ASSEMBLY OF THE ENGINE.

Parts for Steam Engine.

No.	Name of Part	Material
1	Cylinder	Cast Iron
2	Piston	Cast Iron
3	Rear Cylinder Head	Cast Iron
4	Valve Plate	Cast Iron
5	Steam Plate	Cast Iron
6	Front Cylinder Head	Cast Iron
7	Cross Head	Cast Iron
8	Crank	Cast Iron
9	Main Bearing	Cast Iron
10	Eccentric	Cast Iron
11	Fly Wheel	Cast Iron
12	Main Shaft	Cold Rolled Steel
13	Crank Pin	Cold Rolled Steel
14	Connecting Rod	Brass or Cold Rolled Steel
15	Cross Head Pin	Cold Rolled Steel
16	Piston Rod	Cold Rolled Steel
17	Valve Plate Stud	Cold Rolled Steel
18	Valve Rod	Cold Rolled Steel
19	Rocker Arm	Cold Rolled Steel
20	Rocker Arm Pin	Cold Rolled Steel
21	Rocker Arm Standard	Cold Rolled Steel
22	Eccentric Rod	Cold Rolled Steel
23	Spacing Collar	Brass or Cold Rolled Steel
24	Eccentric Strap	Brass
25	Connecting Rod Brasses	Brass
26	Connecting Rod Bushing	Brass
27, 28, 29	Rod Ends	Cold Rolled Steel or Brass
30	Rod End Pins	Cold Rolled Steel
31	Cross Head Guides	Cold Rolled Steel
32	Cross Head Guide Blocks	Cold Rolled Steel
33	Cross Head Slide	Cold Rolled Steel
34	Base	Oak Wood


Fig 1.


Fig. 2.

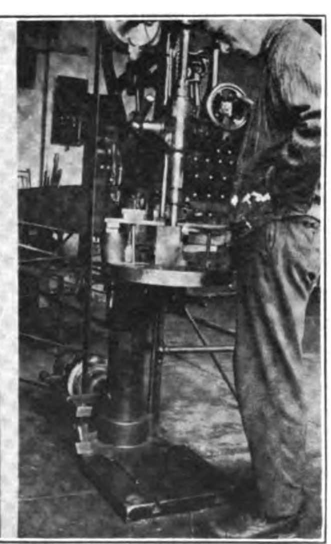


Fig. 3.

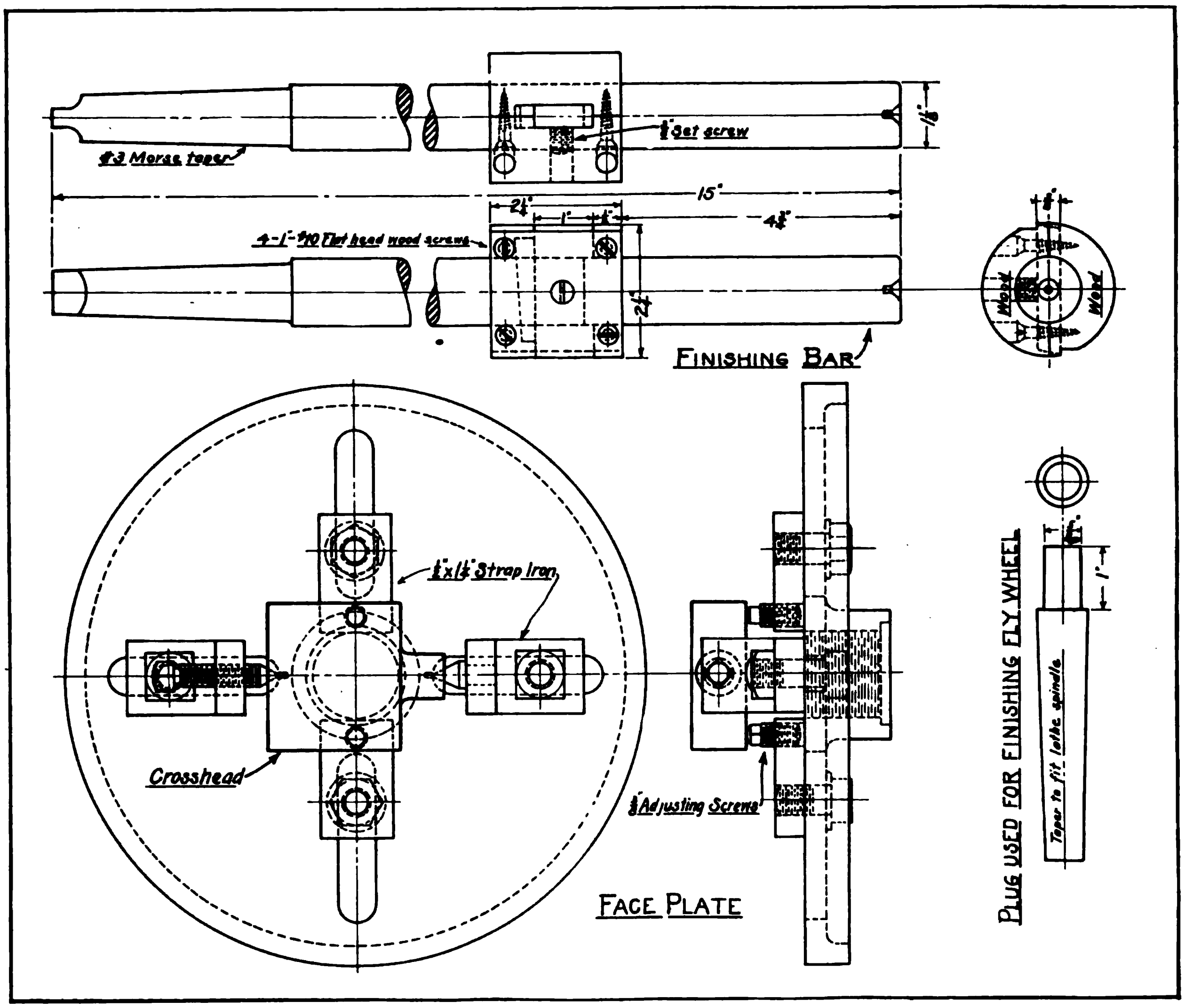


FIG. 4. SPECIAL TOOLS USED IN BUILDING THE ENGINE.

steady the bar while a cut was being taken through the cylinder. This first cut was slightly smaller than the finished dimensions.

After the first cut was through we used a finishing reamer, or boring bar, as shown in Fig. 4. This type of boring bar is referred to above as a tool which is very rarely used at present. Blocks of wood fastened onto each side of the bar and turned to the dimensions required, prevent any vibration or chattering of the cutter and produces a very desirable mirror-like finish on the inside of the cylinder walls.

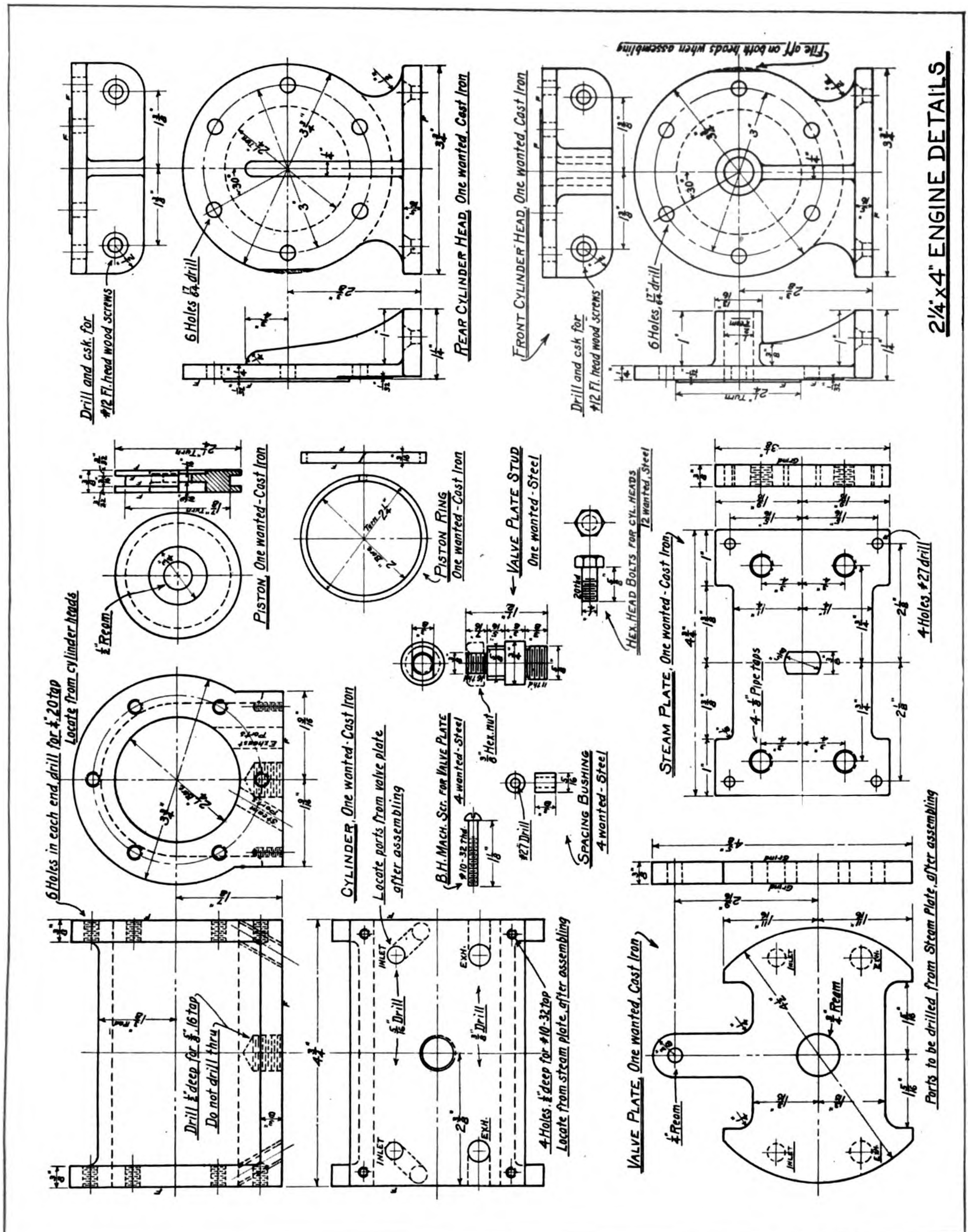
The next operation is to face the ends to the proper lengths. For this operation the cylinder is pressed on an arbor or mandrel and placed between the centers of the lathe. When pressing the arbor into the cylinder, it is well to spread a small amount of oil over the arbor to prevent any cutting or marring of the cylinder walls.

When the ends had been faced, the cylinder was clamped onto the face plate of the lathe, (Fig. 2), for the purpose of facing the valve slide side. Ordinarily this operation would be done on a shaper or milling machine, but our shop had none of this equipment so our lathe had to be used.

The various holes in the ends and side were next drilled and tapped. The end holes were drilled by first laying out the cylinder heads, clamping them in place with a parallel clamp and drilling through each head with a 1/4" drill. The heads were then removed and the holes in the cylinder drilled with a No. 12 or a 13/64" drill.

The next hole drilled was that in the valve slide side for the valve plate stud. This hole was drilled with a 17/32" drill and tapped out with a 5/8" tap. Extreme care must be taken when drilling this hole to avoid drilling through the cylinder wall. When this hole is drilled and tapped, screw the valve plate stud in place and assemble the valve plate and steam plate. Lay out the holes on each corner of the steam plate and drill through with a No. 18 drill. Remove the valve and steam plates and drill the holes in the cylinder 1/2" deep with a No. 28 drill and tap with an 8/32" tap.

The drilling of the port holes was the very last thing done on the engine. The position of each hole was laid out on the steam plate and the entire engine with all working parts was assembled. The fly wheel was turned until the piston was at the extreme end of



the forward stroke and then clamped in place. The inlet and exhaust ports for this stroke were then drilled through the steam plate and valve plate and for a short distance or approximately ⅛" into the cylinder. After these holes were drilled, the fly wheel was unlocked and rotated in the opposite direction, or to the extreme end of the reverse stroke and the port holes for this drilled as described above.

The cylinder was then removed from the engine and placed on the jig as shown in the drawing, and the port holes drilled through. The inlet ports were drilled at an angle of 30 degrees and the exhaust ports were drilled straight. This was to allow any condensed steam which might enter the cylinder to escape easily. The inlet ports were drilled with a 5/16" drill and the exhaust ports with a ⅜" drill.

The successive operations are: (1) Rough bore to 2-7/32" diameter; (2) finish bore to 2-1/4" diameter; (3) face the ends to the right length; (4) face the valve slide side; (5) drill and tap screw holes in the ends; (6) drill and tap a hole for the valve plate stud; (7) drill and tap holes for steam plate screws; (8) drill port holes; (9) scrape and finish the valve slide side.

Steam Plate and Valve Plate.

As will be seen in the assembly drawing, two plates were used in the valve mechanism. One was a movable plate, which we called the valve plate, and the other was the inlet and exhaust of the steam. The outer or stationary plate we called the steam plate.

The valve plate was finished in the following manner. A 23/32" hole was laid out, drilled through the center of the plate and reamed with a 3/4" reamer. Care must be taken to have the plate lie flat on the drill press table when reaming the hole.

An arbor was pressed into this hole and placed between the centers of the lathe. The sides were faced off to the proper thickness and the lathe work on this part was finished. The 1/4" hole in the arm was drilled and reamed, but the four valve holes were not drilled until the entire engine was assembled. The valve plate was ground with pulverized emery and oil after all other work had been done. By rocking the plate back and forth in the way that it was to run, a smooth flat surface was obtained. If care is taken when facing the plate, time can be saved in grinding it.

Steam Plate.

The steam plate was finished by grasping it between the jaws of the lathe chuck and facing off the inner side. The holes for the inlet and exhaust pipes were drilled and tapped out. The center hole was worked out to shape by first drilling two 5/16" holes on 5/16" centers. The remaining metal was chipped out and the hole was filed to fit the valve plate stud. The steam plate was screwed into place on the cylinder and this was also ground to a true bearing surface with the valve plate.

The operations for the valve plate are as follows: (1) Drill and ream a 3/4" hole; (2) face to the required thickness; (3) drill and ream a 1/4" hole; (4) grind to a bearing surface on the cylinder.

The following operations are for the steam plate: (1) Chuck up and face one side; (2) drill and tap steam pipe holes; (3) drill corner holes; (4) drill, chip and file the center hole; (5) grind to a bearing surface.

Cylinder Heads.

The first operation on the rear cylinder head was to chuck it up true in the lathe chuck and face off the inside. Next cut back 1/32" to 2-1/4" diameter. This forms a small projection or boss which will help to centralize the head on the cylinder. Lay out and drill holes.

The front cylinder head was finished in the same way as the rear with the exception of the hole for the piston rod. When the front head was faced a 7/16" hole was drilled through the center. A small boring bar was used to true up the hole, after which it was reamed with a 1/2" reamer.

The successive operations for the rear head are: (1) Chuck up true; (2) face the side; (3) under-cut the side 1/32" deep to 2-1/4" diameter; (4) lay out and drill holes.

For the front head the operations are: (1) Chuck up true; (2) face the side; (3) under-cut the side 1/32" deep to 2-1/4" diameter; (4) drill, bore and ream the hole; (5) lay out and drill holes.

Valve Rods.

Two of the most simple parts of the engine were the valve rods. These were made from 1/4" round cold-rolled steel. When the length of the valve rods was determined they were cut from a long bar and a hand die was used to thread each end to the required length.

Spacing Bushings.

Between the cylinder and the steam plate, small bushings were required to prevent the valve plate from binding. These were made by chucking up a piece of 3/8" cold-rolled steel and turning it to 5/16" diameter. A No. 27 drill was used to make the hole while the piece was still in the chuck. The pieces were cut off to the proper length with a parting tool. The burrs were filed off and fitted to the exact length when the valve mechanism was assembled.

Valve Plate Stud.

The best method for finishing this part is to center both ends and finish the stud between centers. The operations are as follows: (1) Center both ends; (2) face both ends to the correct length; (3) rough turn to 3/4" diameter; (4) rough turn to 3/8" diameter 5/8" from the end; (5) under-cut cylinder end to 1/2" and rough turn to 5/8" diameter; (6) finish turn all dimensions and square up all shoulders; (7) cut threads on 3/8" end; (8) cut threads on 5/8" end.

In cutting these threads on each end it is best to cut the thread on the 3/8" end first and fit a nut, then follow the same method as described for the piston rod.

Piston Ring.

The piston rings for the engines were made up in one lot of twelve rings from a single casting. A hollow casting was made up for this part of the engine and the best mechanic in the class was chosen to do this job.

The outside and inside diameters were first turned and the rings were cut off to the desired thickness. When cutting off each ring, the face of the casting was first trued up smooth before cutting another ring. By doing this it was necessary to face only one side after cutting off.

After the rings had been faced to the proper thickness, they were sawed on an angle of 30 degrees and the proper amount or approximately 3/16" of metal sawed out. The ring was then fitted into a compression jig and a special arbor was used to finish the outside diameter.

The necessary operations are as follows: (1) Chuck up true; (2) turn outside diameter; (3) bore inside diameter; (4) cut rings to thickness; (5) face the opposite sides of the rings; (6) saw out 3/16"; (7) fit in the compression jig, then turn outside diameter.

Piston.

The piston was grasped in the chuck and a cut taken off one side. The hole was then drilled, bored and reamed to a ½" diameter. The next operation was to counterbore one side to ¾" diameter 3/16" deep. It was then removed from the chuck, pressed on an arbor and turned to size. The opposite side was faced to the required thickness and a 3/16" groove was cut in the center for the piston ring.

The operations are as follows: (1) Chuck up true; (2) face one side; (3) drill, bore and ream a hole for the piston rod; (4) counterbore for clamping nut; (5) press on the arbor and turn outside diameter to size; (6) face the opposite side to size; (7) cut a groove for the piston ring.

Pioneering In Manual Arts Teaching In China

F. A. FOSTER

(Conclusion)

Some Chinese Tools.

Fig. 16 shows some Chinese planes and some modifications introduced for their improvement. The feature of the Chinese plane that attracts attention at once is the handles which are at the sides instead of on top. The handles shown on the planes *A* and *B* have two tenons fitting into mortises in the sides of the body. Fig. 17 shows a detail of the handle. In order to put the handle onto the plane the handle is split along the line *ab,* just above the tenon. The tenons are glued into the mortises and the split handle glued together.

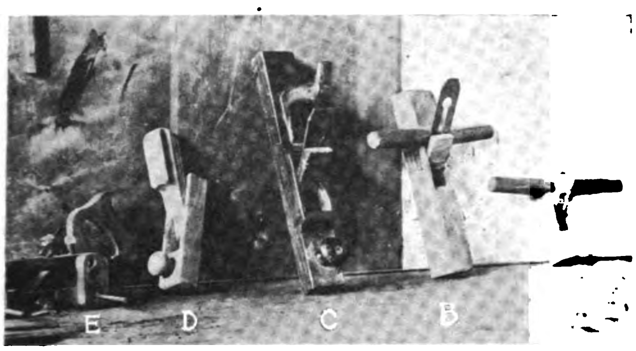


FIG. 16

Figs. 16-a, 16-b, 16-c, show some other forms of Chinese planes and their peculiar handles. Fig. 19 shows some Japanese planes which had been used at the school by a former teacher, either a Japanese or a Chinese who had had Japanese training. These have no handles and are intended to be pulled toward the workman instead of pushed away. Another feature of these planes is that the cutters are not held by a wedge but are dependent on the tightness with which they are held in their grooves by friction. There is no cap iron. The Chinese planes have the throat opening at the middle of the bottom instead of well forward as on American planes. This probably gives a better balance for their way of holding the plane. Chinese planes are generally narrower than American ones of the same length. One and one-quarter inch to 1½" are the usual widths. Belgian or French plane irons are quite common but are seldom used with a cap iron. A wooden or iron pin is usually put through the body near the top of the throat for the wedge to press against.

The wood used for Chinese planes varies in different localities. Teak, walnut, locust, ash, oak, and date wood are used. The date is not that of the date palm but a tree bearing a fruit greatly resembling the common date. The wood of the date tree, called "tsao mu" is extremely hard, heavy and richly colored, resembling ligunum vitae. The planes made for the first class, by a local carpenter, were of unseasoned locust, and were so poor that it became necessary to have new ones made. This gave an opportunity to introduce a new and better type, shown in Fig. 22-C. This found special favor with the students because, the handle being at the top, (an adaptation from the American) the student did not scrape his knuckles on the work, as happened occasionally with the handles at the side. The wood selected for these new planes was a yellow walnut, called "huang tan mu," very hard, clear and straight grained and capable of taking a high polish.

Fig. 16-D shows a block plane having the handle and wedge all in one piece, evolved to take the place of the Chinese block plane shown in Fig. 16-A.

Needing some rabbit and moulding planes for cabinet and furniture work, an attempt was made to have the students make a combination plane of wood adapted from the iron combination plane made by a well known American firm. Fig. 16-E shows the plane as drawn and made by every member of the first class. A few small parts were made from brass castings, locally made and the extension rods were of bar iron polished. The wood was the yellow walnut. The thumb screws were made from large wood screws with the wings brazed into slots cut with a hack saw. In order to have the holes for the set screws a good fit and full thread in the extremely hard wood, a tap was made from one of the screws by filing three flutes and filing off the thread at the small end to the bottom of the thread for a leader or pilot. A square was filed on the head end for a tap

wrench. The holes made by this tap gave a full thread and were very durable.

Chinese Saws.

The saws used by the Chinese woodworker are of the frame type. The blades of the smaller sizes are often of Belgian or French make, although some are

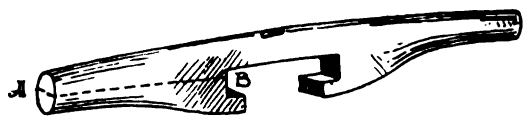


FIG. 17 Handle of a Chinese Plane

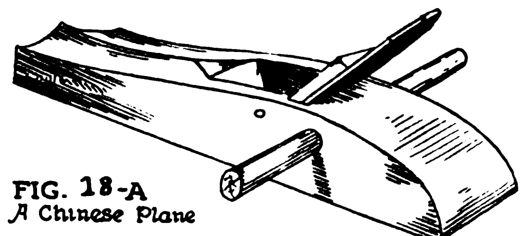


FIG. 18-A
A Chinese Plane

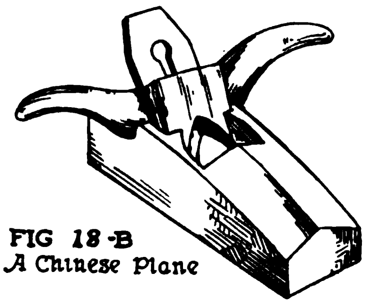


FIG 18-B
A Chinese Plane

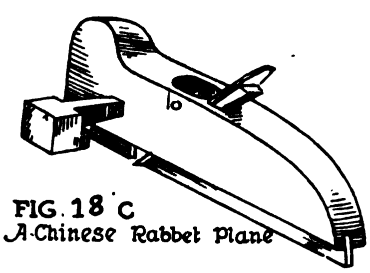


FIG. 18 C
A Chinese Rabbet Plane

manufactured locally. The larger ones used for sawing logs into planks and boards are all made locally and have the teeth of one half facing in the opposite direction to the other half, as shown in Fig. 20. When it is desired to build a house or to get boards for any woodwork in sufficient quantity, the logs are usually brought to the premises and sawed up there. Fig. 21 shows boards being sawed from a log by one of these large frame saws. It is seldom that the sawing is done sufficiently in advance to allow the boards to become thoroughly seasoned. They have no good method of drying wood as it is done in an American dry-house. Their way of drying boards is to dig a pit nearly as long as the boards. In the bottom of the pit a fire is made, often with sawdust, and when there is a good bed of coals or a smouldering fire, the boards are laid over the pit and occasionally turned over to dry. Needless to say this process is not a thorough one. Much of their work develops cracks and open joints as the wood gets dryer.

A very interesting fret saw is shown in Fig. 22.

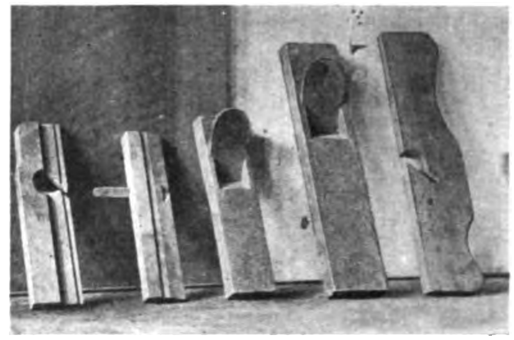


FIG. 19.

The frame is made of a strip split from a section of bamboo and bent into a bow. The blade is made from a piece of *round* steel wire fastened by winding it around the ends of the bow. The teeth are made by laying the wire across the corner of the bench, after it is stretched, and cutting the teeth with a hatchet or a heavy chisel. This makes a surprisingly efficient blade and is quickly prepared. Fairly thick soft wood can be

FIG. 20 A Chinese Saw Blade Used in Sawing Logs into Boards

cut with such a saw and they cut out some quite complicated fret work in China.

Fig. 23 is a carpenters' inking line, pot and marker. The body of the one shown was made of horn. Others are made of wood. The body is filled with cotton saturated with a black ink mixed with water. The end of the line usually has a hook for attaching to the board or log to be marked. The line wound on the reel has to traverse the wet inky cotton when it is drawn out. The marker is dipped into the cotton and used as a pencil

FIG. 21.

for squaring lines, etc. In marking a log for sawing into boards the ends are squared off and the lines for the thickness drawn across the ends while the log is lying horizontally, so that the lines can be "plumbed" and so be parallel on each end. These lines on the ends are then connected by "snapped" lines which furnish a guide for the sawyers when the log is inclined or set on end as shown in Fig. 21.

Boring Tools.

The Chinese seem to be rather deficient in good boring tools. Fig. 24-A-B shows a common carpenter's bitstock or drill. This is used for drilling holes up to preciate the good points of any tool. The greatest drawback to the introduction of many of the foreign tools seems to be the high cost compared with the wages the workman receives. The average workman is getting good pay if he gets thirty to forty cents (U. S. money) per day. In Fig. 25 is seen another type of driller called a "pump" drill used for drilling metal or small holes in wood. This can be seen in use in Fig. 5. The spindle has a sort of balance wheel at the top and gets its motion from the cross-piece handle through which the spindle passes. The handle is connected to the spindle by small straps which are wrapped around it.

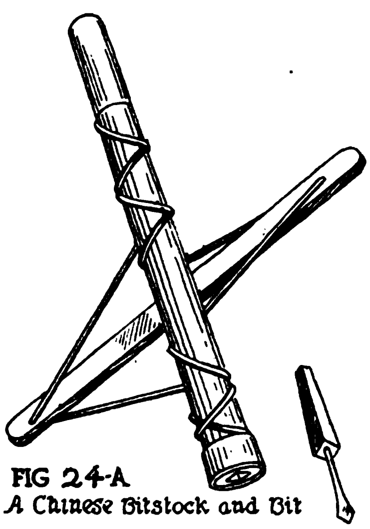


FIG 24-A
A Chinese Bitstock and Bit

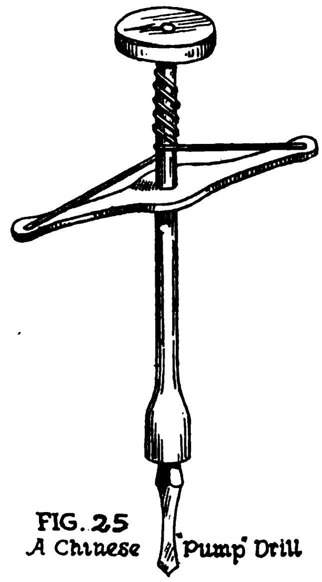


FIG. 25
A Chinese "Pump" Drill

FIG. 23
A Chinese Woodworkers Marking Line and Pencil

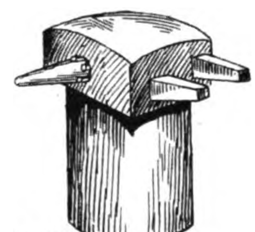


FIG 26
A Chinese Anvil with the Horn as a separate Piece Wedged in

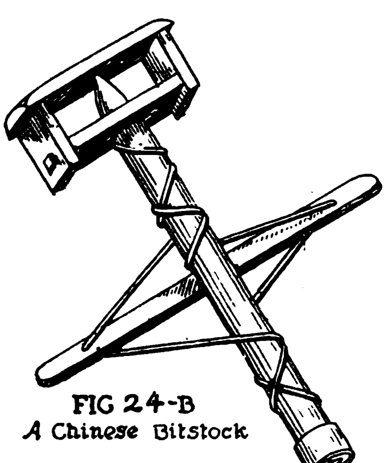


FIG 24-B
A Chinese Bitstock

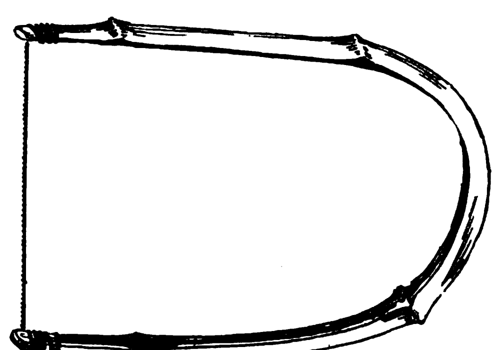


FIG. 22 A Chinese Fret Saw of Bamboo and Wire

FIG. 27
A Chinese Blacksmith's Hammer

about half an inch diameter. For a larger hole than that two men are required, one to hold the drill while the other works the "fiddle bow" or strap wound around the spindle. For larger holes they often require two men to pull, one at each end of the strap. Such a drill can be seen on the end of the bench in Fig. 4. Time, however, seems to be a small consideration with the average Chinese workman. The motion of the drill being reciprocal, cuts only half the time. American bits and bitstocks were introduced in the work of the school and are beginning to be much appreciated by the native workmen, who, by the way, are quite keen to ap- The downward motion of the handle must be stopped quickly before the straps are quite unwound and quickly reversed so as to allow the balance wheel to wind the straps around the spindle in the opposite direction.

The drills or bits used in the Chinese bitstock are usually made with a tapered square shank and, in the case of smaller sizes, are made with a wooden shank into which a wire nail is driven and the end of the nail hammered to an acutely flat pointed end a little wider than the diameter of the nail, at the widest place. See Fig. 24-A.

Blacksmith Work.

Blacksmith work was introduced toward the end of the course of the first class. The tools used by the Chinese blacksmith are in many respects similar to those used in America. The hammer used by some of the blacksmiths is somewhat different from ours in that the head is made decidedly oblong instead of round. See Fig. 27. The anvil is often lighter than an American anvil and is hollow to fit onto the top of the block.

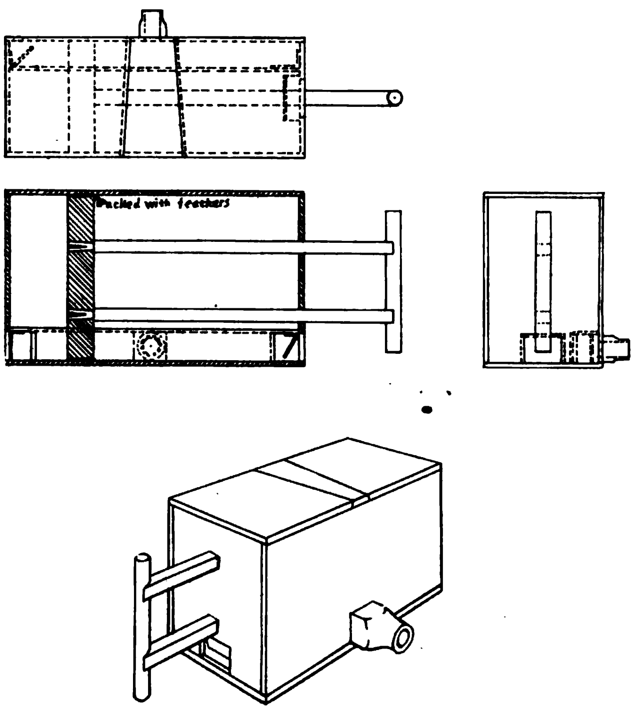


FIG. 28.

The forge is usually built up of brick with a clay tuyere across which a few small round iron rods are laid for a grate. The fire bakes the tuyere into a brick. The blast is usually obtained by means of a "wind box" similar to that shown in Fig. 28. The handle connects to a piston fitting easily in the box and packed with feathers glued to the outer edges to make it air tight. Inlet, flap valves at each end permit air to be forced with both strokes of the piston. This makes quite an efficient blower and is used very extensively throughout China. Such blowers are often used in the native foundries for the cupola blast. When used for such a purpose they are often made with a five-foot stroke and require four or five men to operate them.

Chinese Students.

To one who can enter the work of teaching manual arts with interest in the student as a leading stimulus, the work in China is attractive. The students seem to respond to the efforts of the teacher satisfactorily and the average Chinese young man is not so very much different from his American brother. The Chinese students have a power of concentration on their work that is not equaled by our American boys. At the Chihli Higher Normal College, one peculiar feature which is a survival of the old customs, is that of studying aloud. A class of students occupying a study room in the evening resembles pandemonium for each student is studying his lesson aloud as unconcernedly as though alone.

The Chinese students are keenly interested in the transformation of their country to meet modern conditions. Those who take up manual arts are especially strong factors in the future development of the country. A strong students' union has been established throughout the country for the purpose of bringing about reforms and the establishment of better government. The strength of the organization was given a good test last year when an attempt was made to throw off the influence of a certain country in government affairs. An extensive boycott was inaugurated and considerable accomplished in bringing the political danger before the people. Schools were closed for some time and the students went out around the country and in the city streets explaining to the people the situation and developing a stronger feeling of unity and patriotism among them.

An interesting feature of the work was the part that some of the students of manual arts took in many of the cities. While the schools were closed and during the summer vacation, many of the students spent their time in teaching the guild workmen new ways of doing work which would enable them to make some of the simpler things that hitherto have been imported from a neighboring country. This attitude of helpfulness is much to be commended.

On the whole it may be said that manual arts is making gratifying progress and is bound to have a far-reaching effect on the country in the years to come. Although there is not the financial backing that there should be, it is being more and more recognized as an important work. Often the lack of funds leads to restricted plans of the teacher, but it also puts him on his mettle to meet the restricted course by some home-made device of his own, giving a zest that can only be appreciated by those who love the work.

WET STICKS*

A Fable For All Teachers, Art or Otherwise, Who May Have Discovered "Wet Sticks" In Their Own Classrooms or Workshops

G. S. Twichell, Fitchburg, Mass.

ONCE upon a time there were two men who were called upon to do a certain task for their master. This task was to make a fire, using the material which the master provided for the purpose. Now it happened that these two men were equally skilled in certain lines of work, and the master said, "Certainly they will do equally well at this task which I have given them." And he left the material and went away. It also happened that the men were given different places in which to work, both places however, being equal in everything except exact location, which was a small matter anyway.

After the master had gone away, leaving his instructions, they set to work to make their fires, although neither knew how the other was working, as they were separated by a high wall. The first man commenced to hum at his work, thinking that it would be fun to build a nice fire and please the master. He looked over the material which had been given him. It appeared to be ordinary wood of various lengths and sizes, and he started to make up the fire.

"Aha," he cried, as he picked out some nice, dry sticks, "I am sure I can make a fire to please the master because this wood is so nice and dry, and just the right kind to burn brightly." And he commenced to whistle a gay tune as he laid the sticks together and started them burning. Soon, however, he saw that some of the sticks were much too long, and he carefully cut them so they did not take more room than necessary. Then he noticed that several of the sticks were wet and would not burn at all. He stopped whistling and thought for a minute. "Wet sticks will not burn," he mused. "Now the master knew that, and why should he ask me to make a fire from that which will not burn?" He puzzled a while longer, then suddenly his brow lightened. "Why should I waste time questioning the master's orders? He told me to make a fire from the material which he gave me, and that is enough for me to know."

"Dry wood burns," continued he, "therefore I will make dry wood of the wet sticks and then they will burn." And he forthwith gathered then up carefully. The too long sticks he cut to the right length and the crooked sticks he trimmed off so they would not interfere when laid on the fire. He picked out the brightest and hottest spots in the fire and laid the wet sticks above the bright ones.

"Now," he said, "if these sticks were ever meant to burn, they will commence to burn after they are dry. I have placed them where the heat from the burning sticks will dry them, and I think they will begin to burn themselves in a little while." Soon they commenced to steam, and smoke a little, and the workman found a slight frown gathering on his forehead, and he stopped whistling for an instant.

"Ah, me," he sighed, "steam and smoke do not make a good fire," and he looked more closely. The wet sticks had commenced to dry.

"Aha," he laughed, "it is only the wet sticks. They are beginning to dry, and of course they will steam and smoke a little, but this isn't really doing my fire any harm after all. The dry sticks are burning just the same, only I could not see for a moment through the steam and smoke." And he carefully moved the drying sticks around into places where they would dry still faster. In a little while longer, he again started whistling gaily as he discovered that some of the sticks were dry and had commenced to burn. They did not all burn as well as the dry wood, but still they were really burning and others were drying. And as he watched them with a smile on his lips, he was delighted to find that some of the wet sticks gave off little flecks of color and light every once in a while, making them even more interesting to watch than the dry sticks which burned steadily along.

"Ho, ho, little wet sticks," he cried, "you have been through different places from those which your brother sticks have visited, and have gathered up some things which the dry sticks have not. You were never meant to start a fire with; you must have been meant for some other use. However, the master brought you here and therefore there was a reason for using you. Now that you are dry you help make the fire a little bigger and warmer, even if you do not make a big crackling blaze like the dry sticks." And he again moved them carefully near the hottest part of the fire so they would dry still better. At last the sticks were nearly all burning, and even the wettest ones were drying. Then the workman sat down to rest. "The wet sticks were never

*A few of the "whys" for this article.

In industrial work in the West. A young man taking placement training under the Federal Board was reported by the shop foreman as being "absolutely no good, and I won't bother with him any more." The man was transferred to another shop doing exactly the same line of work and later reports came in that he was doing fine and was going to be one of their best workers.

In an art institute in the East. An instructor was so unwilling to allow any but those of exceptional talent in his class, and so outspoken in his condemnation of those he considered of "no ability," that six pupils in one class, a specially talented group, changed their plan of work and entered another department of the institute rather than continue study with him. A majority of the others cut class as often as they dared, running the risk of not getting a passing mark rather than work in such an atmosphere of criticism and partiality.

In hospital training of ex-service men in the South. A half dozen especially "difficult" cases where men were considered "triflin'," unapproachable or useless to try to interest in either occupational or vocational work, have been brought back to earnest study or work by certain teachers who refused to believe the general opinion that the men were "no good." The teacher's attitude in the rehabilitation work is especially pronounced in its effect upon the men.

meant for fire-wood," he said, "but I have done my best with what the master gave me."

The other man, while all this was going on, had started to make his fire, cheerfully picking out the round dry sticks and putting them in place. Then he lighted the fire. The sticks blazed up bravely. Toward the bottom of the pile, however, he found an armful of wet sticks, some of them much too long, and not of good shape for the fire.

"Hum," he cried, "what is all this wet wood doing here? The master knows that wet sticks will not burn. But he said to use it all, so I suppose I must." And with that he threw the wet wood on top of the fire so suddenly that it knocked some of the burning sticks off. This angered him and he kicked the burning sticks back into the fire and snatched the wet wood off.

"What is the use of trying to burn that old stuff?" he muttered. "It never was meant to burn, and it is just putting out the rest of the fire." Then he looked at it again and picked up one or two sticks which seemed to be not so wet as the rest and tossed them back on the fire where they commenced to steam and smoke. The other sticks were some of them very long and he threw them one side without attempting to either cut them down or dry them.

"What is the use of trying to dry them?' he argued with himself. "It takes too long and I have to attend to the good sticks which will burn." Then suddenly he noticed a nice dry stick which was burning brightly at one end but had a branch sticking up from one side which got in his way when he went to pile on more sticks. He snatched this out of the fire and stamped on the burning end until the fire was out. Then he tried to cut off the branch, but it was hard wood, and he soon tired of trying to cut through it, and tossed it to one side. In doing this one end of the branch hit a wet stick and flung it against him. He reached down for the wet stick and threw it angrily over the wall. (A few minutes afterward, the first man found it, dried it carefully, and added it to his own fire, making it that much bigger.) The other wet sticks this second man tossed one side also, and again picked up the dry stick with the branch on it.

"This stick is one of the best kinds to burn," he muttered, "but that branch is upsetting all the rest of the fire. I suppose I will have to use it however, as the fire doesn't burn as well as it might." And so he threw it into the edge of the fire in such a way that only the end was charred and finally stopped burning altogether.

While he had been throwing the wet sticks away and groaning and muttering because the wood was wet, and even the dry sticks had branches on them, the fire had begun to die down for lack of care and only the biggest and driest sticks were burning. These had a good start and would burn without further attention, in fact, even if the man had tried he could not have stopped their burning.

All at once the high wall between the two men vanished and the master stood between them. He looked in silence at each man's fire, and then commenced to speak.

"You both had the same task given you—the conditions were the same and the wood was carefully given out in the same proportion of wet and dry. Some of the wet sticks will never burn, but they can be used for something else after they are dry. The dry sticks would burn anyway, if the fire was started. Anyone can make a fire with good wood. This first man has not only made a fire, but he has carried out my directions to use *all* the material I left you. Even if all the wet sticks did not burn, he has dried them so they may be now used for something else equally as valuable as for making fires. All wood was not intended for fire-making, and the good workman does not condemn and throw away material just because it is not suited to his own immediate needs. You"—he turned to the second man, "have not only thrown away material which is valuable to someone else for other purposes, but you have neglected the rest of the fire while you were complaining, and half of the fire has already died down. You have made a fire, it is true—thus far you have carried out my orders. I give you full credit for whatever you have done, but further than that I will not go. You have obeyed but a small part of my instructions and I shall have no further use for your services hereafter."

Turning to the other man he said, "You have obeyed my instructions to the fullest, have shown yourself careful in the use of another's goods entrusted to your care, and have withal kept cheerful in the face of difficulties. I have more and still greater work for you to do, and your reward will be in proportion to the work."

And the second man remained with the master and was happy.

> The question of Art is altogether a question of social reform. Art must grow out of the life. If the life is not so ordered that Art will appear as its crown and fulfilment it is idle to foster and upbuild it. To give it independent development is to preserve the empty form and overlook the vitalizing spirit.—*Oscar Lowell Triggs.*

Industrial Work In The Junior High School

A. F. Benson, Principal Jordan Junior High School, (Bremer) Minneapolis.

IN discussing the industrial work in the junior high school, I am keeping in mind the fact that there are people who sincerely believe that our schools should do little, if anything, in any other line than the socalled purely cultural work of the traditional school. We will not attempt at this time to answer directly any of their arguments. Their number is becoming less and less as the days go by.

The junior high school recognizes, possibly more fully than any other educational organization at the present time, the place of industrial experiences, paralleling the purely academic experiences during the early adolescent period of a boy's or girl's development.

Perhaps a better term than industrial work would be the term "motor activity" but we shall use the accepted term "industrial."

A boy of the junior-high-school age is not ready to select his life's work, along either industrial lines or the more strictly [illegible]ofessional lines. The business of the junior high s[illegible]l in both its academic and industrial departm[illegible]o push back the horizon line so that the boy [illegible] for i[illegible]nstantly getting a new view of himself in rel[illegible] the world conditions with which he finds himse[illegible]rrounded. With this view of school work, the teacher of mathematics or of geography is just as much a prevocational teacher as is the teacher of printing or of cabinet making. In a very definite way, every teacher of a junior high school is, and should be, an educational-vocational guide.

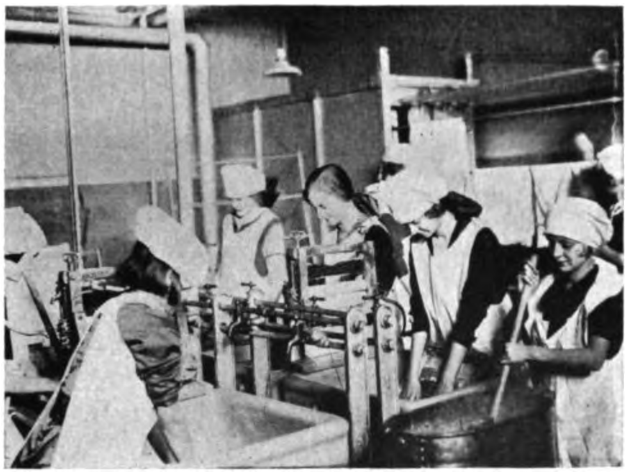
Unfortunately when the industrial work of the junior high school began to be prominent, it was largely with the vocational or trade idea in mind. In fact some of our junior high schools were almost cast upon the rocks because of this idea. At the present time there are few, if any, junior high schools that have not abandoned the trade or vocational idea in their industrial department. It is true, however, that with a few individuals the industrial work will assume more and more of the trade idea but these cases are individual and need not be considered in our discussion at the present time. In considering the industrial work of the junior high school we now use the word prevocational. This, it seems to me, is the correct term to use but I do wish the term prevocational would be applied to the academic department of our junior high schools as well as to the industrial department. Music if rightly taught is prevocational. It can also be taught from a vocational point of view. In all of the work of the junior high school, the pupils must work with worth while material and the application must be present and not future. The chief difference between a junior high school and a senior high school lies in the fact that in a junior high school we are working with present and not in deferred values.

SHEET METAL SHOP.

HOME MECHANICS CLASS

The number of different lines in the industrial department of a junior high school will be very largely determined by the size of the school and the community in which it is located. It is not practical for a junior high school of a hundred or two hundred students, to attempt to do all the lines of industrial work being done in a school of 1200. The overhead expense would be entirely too great; and the time has come when we must recognize that there is a limit to the amount of money that communities can raise for school purposes, no matter how much they might desire to give unlimited financial support to their public schools. The problem before educators today is to determine the things that a school can do and the amount of money that the community can raise to do this work. Many communities have just about reached their limit.

Another reason why the smaller school should not try to do all the industrial work of the larger school is



PRACTICAL LAUNDRY WORK.

that the needs of the community are different. The out-of-school activities and the interests of the people are not the same as they are in the larger community. In the junior high school, we must endeavor just so far as possible, to give to our boys and girls experiences that are not duplicated in their out-of-school activities.

When a boy enters a junior high school where there is a variety of industrial work, I believe it unwise to ask him to make a selection of the industrial activity in which he desires to engage. If the boy's aptitude is well known to his teachers and he has had sufficient experience to make the selection, there is no serious objection to his doing so no matter what plan may be followed. Personally I feel it is hardly right to ask that a boy make a choice of the shop in which he wishes to work, before he has had any chance to explore the various lines of work offered. While giving him this opportunity for exploration, he is not only exploring the opportunities offered in the school, but he is making very definite observations in the realm of exploring himself as an individual.

At the Jordan junior high school we are, at the present time, offering for boys the following lines of work: woodwork, printing, sheet metal, agriculture, electricity and mechanical drawing. During the first year the boy has an opportunity to work for six weeks in each one of these departments, during which time the instructor observes the boy very carefully. There are reactions as he passes from one line of work to another. The boy himself is observing and registering his own ideas as he passes from one shop to another. At the end of this first year pupils are asked to select three lines in which they wish to work during the second year. As indicated above, in individual cases a boy may select one line rather than three. In such cases the industrial work for that individual boy becomes more and more of the vocational type. Whatever is for the best interests of the boy, that we do, irrespective of any plan we lay down or any "red tape" that may have wound itself around our organization. First, last and always, the boy is to be considered rather than any pre-conceived plans of adults. In this try-out work we include the work on a typewriter. The commercial work of a junior high school is, and I believe ought to be, on a shop basis. It is just as important that a pupil find out early that he does *not* want to operate a typewriter, as it is to find out that he *does* want to operate such a machine.

In the third year of junior high school, or the ninth grade, pupils may select one of the following three courses: academic, industrial, commercial. If they select an industrial course, as a great many of them do, they may then select the shop in which they wish to spend all the time given to industrial work during this year. One third of the time is spent in the mechanical drawing department. This time may be either the first, second, or third twelve weeks of the year. The work of the department is made to correlate closely with the shop in which the boys spend the other 24 weeks of the year. In the ninth grade also a boy may select mechanical drawing as his major. This will give him 24 weeks in the mechanical drawing department and twelve weeks in any one of our shops that he may desire. In other words, during the last year of the junior high school, if a boy majors in a shop he is required to take twelve weeks of mechanical drawing. If he majors in mechanical drawing he is required to take twelve weeks in a shop.

During the first two years every[illegible]quired to take some form of industrial work. T[illegible] of industrial work in the second year is very largely optional while in the third or last year it is entirely optional. During the first two years about one-fourth of the day is devoted to industrial activities. This includes applied art, which is given eighty minutes a week. The art work in the Jordan junior high school is based entirely on design and applied to the school and out-of-

TABLE MANNERS ACQUIRED BY PRACTICE.

school activities of the boys. The art department is functioning in the lives of these boys in a way that art has seldom done. We believe in having a man in charge of this particular line of work.

The line of work that we give in our shops at the present time is very largely the result of experiments and experience. We believe that the work should be outlined entirely on a unit basis, arranged in such a way that a boy understands the goal for which he is aiming in each unit of work, at the time he begins that unit. In other words, we believe in an objective being not only in the mind of the teacher but in the mind of the pupil as well. While appreciating the oneness of each unit, we also appreciate the fact that the work of any unit is a factor in accomplishing the work of the following units. This is true whether a boy is working in the wood, sheet metal, printing, agriculture, electrical or mechanical drawing departments.

One of the best courses that we offer at the present time is a short course in home mechanics. One object of this is to connect the home with the school. In fact, in all of our work, we encourage pupils to do the thing that is going to be of some value, not only to the boy as an individual but will also contribute to the life and the unity of the home. We encourage him to bring from home things that may need repairing. There is no reason, for instance, if a boiler needs repairing why the boy of the home should not bring that to school and be taught how to make the repairs. If a chair needs a new rocker, we encourage the boy to bring the chair to school, make the rocker, re-finish the chair, and take it home fit for use. In the home mechanics work we give such units as the following:

Work on windows. In this we take up the matter of fitting windows, how to prevent rattling, the removal of a sash, fixing the weight ropes, care of catches and pulleys, etc.

Locks. Another unit is locks. Here we teach the different kinds of locks, how to put them on, how to reverse, how to locate trouble and how to repair same, and the remedies for locks not remaining latched.

Glazing. We take up the question, in another unit, of glazing in which we give actual work in the cutting and fitting of glass, preparing of the sash before the glass is fitted, etc. At this time we show the boy something of how glass is manufactured.

Wall Papering. Another unit we give in the home mechanics course is papering, at which time we give them actual work in figuring the cost of paper, how to remove old paper, how to clean and repair wall paper.

Electric Repairs. Another unit is the repairing of electric door bells, replenishing batteries, how to locate the cause of blown fuses, how to replace the fuse and what is the general purpose of fuses.

Another short unit is that of *plumbing*, care of water pipes, repair of faucets, etc.

These are only a few of the units given in this home mechanics course but I think they are sufficient

MAKING A CHRISTMAS TREE FOR THE BIRDS.

to show that this course is of practical value. At the present we give this to boys only. We shall in time give a similar course for girls. There are some things regarding the question of plumbing and electric wiring, that the girl in the home should know just as well as the boy in the home. There are many things that the girl ought to know so as to save expense or to prevent disaster, until an expert can arrive on the scene to repair damages frequently caused around the home through lack of knowledge.

Throughout all of the industrial work we emphasize the reading of blue prints and the following of charted directions in the various units of work offered. Free-hand sketching is also an important part of our work, or as we sometimes put it up to the boys, "talking with the pencil." This leads directly to the laying out of patterns.

In all of the shopwork, pupils are taught to keep accurate account of material used and the cost of it, time spent on the job and to make an estimate of the value of that time. We sometimes get the cost of the entire job from the commercial standpoint and from this estimate the practical value of the pupil's time.

In all of the industrial work of the junior high school we are not so much concerned with the object to be made as we are with the pupil to be taught. The needs of the pupil and his desires must be the guide in determining what each individual should make as he passes through our various shops. Industrial work, to be rightly handled, cannot follow a cut-and-dried course of study based on the old idea of making a series of models or even making a series of practical, usable, articles.

A question that nearly always arises in the discussion of industrial work of any type of school is, "Should the shops be on strictly a commercial basis?" From a standpoint of organization, all of the industrial activities of either girls or boys should be organized as nearly as conditions will allow on a practical shop basis. By this I mean that the movement from one point in the shop to the other should be so planned that there will be the least amount of time wasted and the fewest number of steps taken. I also mean that a part of the work

at least should be organized so that one boy or a group of boys will do one operation a number of times, passing the product along to another group who will do another operation, sending it on through different groups until it is completed. This organization of work is desirable to give the boy an elementary insight into actual shop practices.

I see no reason why the shops of our junior high schools should be expected to pay for themselves commercially any more than the arithmetic classes or the history classes. I do believe that the material in the article that a boy may make, which he takes into his home, should be paid for by the pupil. This material should be given to him at cost. As an illustration of this, we have a group of boys making cedar chests. The material for these chests costs $15 or $16. When completed they will have a commercial value of from $50 to $60. The boys pay for the material and take the chests home with them. The same thing is true in nearly every one of our shops. The material for beginning work in any shop, however, when it is used for the purpose of demonstration, should be paid for by the school authorities.

While I am not writing at this time particularly of our girls' activities, I do wish to say that our sewing and cooking departments are more or less self-supporting. This is absolutely true with regard to our cooking department. Here the only expense paid for by the school authorities is the salaries of the teachers. Material used is paid for from the proceeds of the lunch room. The demonstration kitchens and the lunch room are considered as one unit and under the same management. The lunch room affords an outlet for the products made in the demonstration kitchens. This plan has been a success with us for over three years and we would not return to the old methods of handling demonstration kitchens and lunch rooms under any circumstances. In the sewing department the girls are more and more bringing from home the material to be used. This is as it should be.

In the junior high school industrial work, where the idea is strictly prevocational, the shop teacher must constantly give information regarding materials used. This will naturally bring in a great many details of interesting allied information. As a boy passes through our shops we expect him to get an idea as to the goal to which this particular activity may lead him. That is, we want him to get an idea of the allied industries of which his shop activity may be considered the foundation. In this way we impart to the boy a great deal of vocational information.

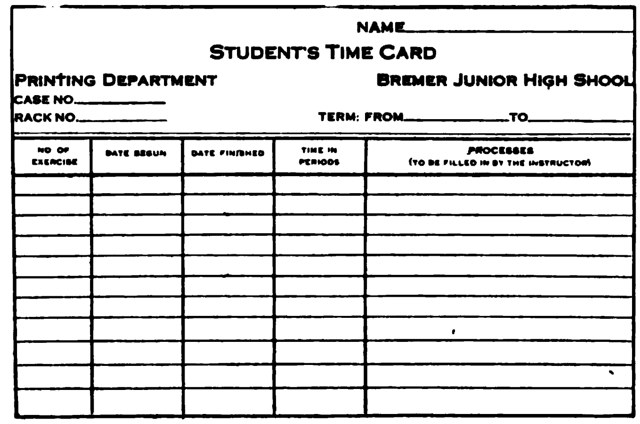
Much might be said regarding records kept of a boy's work as he is going through our industrial department. Each department has records peculiar to its own work. For instance, the printing department has certain records that are not necessary to keep in any other department. We do, however, have a general industrial record card that shows a boy's work as he passes from shop to shop through the three years of our junior high school. This general card shows not only the shop the boy is working in at the present time or in which he has worked, but indicates exactly the work he has accomplished in each of the industrial centers. It also shows the home credits he may have received in any one of the shops. It shows the instructor's comment and the boy's comment regarding the work, and any comment that seems to be necessary regarding the boy's physical condition. It also shows whether or not the instructor gave any vocational advice. It is interesting to follow these records and to compare them as a boy passes from one shop experience to another. The principal can get a good idea of the boy and his reactions by studying carefully his industrial record card. It is not infrequent, at all, to find that one instructor's comment does not in any way agree with that of another instructor, with whom the boy may have worked previously. This card gives a splendid basis for interviews with the boy regarding his likes and dislikes, and his future ambitions.

There has been a great deal of controversy over the question of whether or not teachers of industrial subjects should have teaching experience without having had the actual trade experience, or whether it would not probably be better to take a person with trade experience and no teaching experience or preparation. It appears to me that neither of these extremes is advisable. We want men in the shops of the junior high school who are academically as well prepared as any teacher in the academic department. I think this is necessary if for no other reason than for the influence upon the boy as he thinks of himself in relation with what we call industry or trade. We want him to realize that a foundation knowledge of the integrating subjects of education is absolutely essential. Just as we expect a teacher of history to specialize in history over and above the general academic preparation, so we expect the teacher in the shops to specialize in his particular line of work. This special preparation means not merely a supplementary knowledge gained through a short course in some training school, but it means actual trade experience. Some one may say that it is impossible to have this combination. True, it is rather hard to obtain. This has been especially true during the past few years. It is not going to be so difficult from now on, provided boards of education not only keep the salaries where they are at the present time but further advance them, notwithstanding the cost of living may be going down somewhat. If our schools are going to succeed, we must pay men and women, not only in the industrial department but in all departments, the salaries that will get the type of persons we need and then keep them. We ought not to be content to accept a substitute for the genuine article in teaching any more than we would in our food stuffs. America must realize that its children

deserve, and must have the best, from the standpoint of school opportunities.

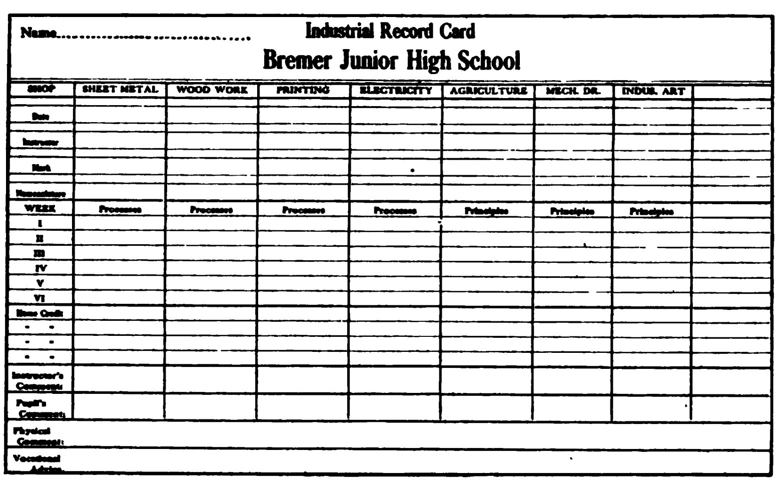
When I say men can be secured in industrial departments that will meet all requirements listed above, I am writing with experience. In our own school there is not a man in the industrial department who does not qualify academically and who has not had the trade experience that we so much desire. It may be added also that the men who are teaching in the academic department are, some of them, able to go into the industrial department, should the occasion demand. This brings about a very close correlation. And it is true that each week brings about closer correlation between the industrial activities of our school and academic work.

Much has been said and written regarding vocational guidance. Personally I do not like the term, vocational guidance. I would rather use the term, educational guidance. As stated above each teacher of each subject should consider himself or herself an educational guide and therefor a vocational guide. However, it seems advisable to give a definite amount of vocational information during the three years of the junior high school work. This ought not to be done in a haphazard way. Some of it can be, and is done, through the English department. This should be continued. Some is also done in the various shops in connection with the regular work of the shop. This also should be continued. Over and above this however, we make a definite study of type occupations. This means not only trade occupations but professional as well. We spend at least one, and in some cases two 40-minute periods a week with all of the boys taking them in small groups at which time we present to them certain occupations

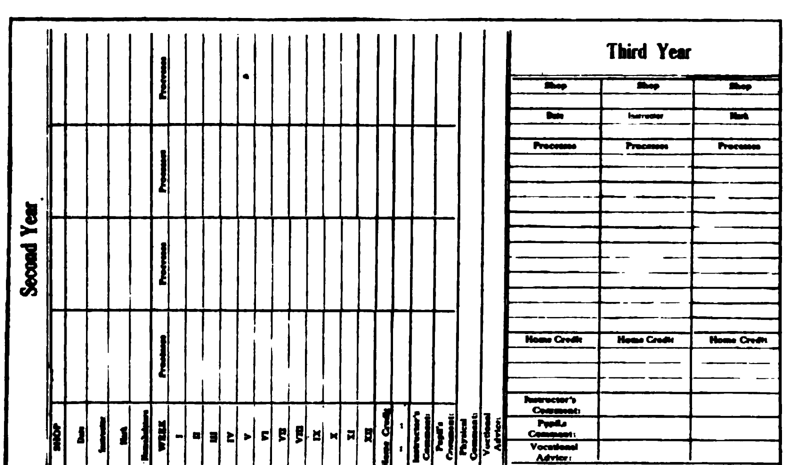

NAME
STUDENT'S TIME CARD
PRINTING DEPARTMENT BREMER JUNIOR HIGH SHOOL
CASE NO.
RACK NO. TERM: FROM TO

NO. OF EXERCISE	DATE BEGUN	DATE FINISHED	TIME IN PERIODS	PROCESSES (TO BE FILLED IN BY THE INSTRUCTOR)

TIME CARD FOR PRINTING CLASS.


Name..............................
Industrial Record Card
Bremer Junior High School

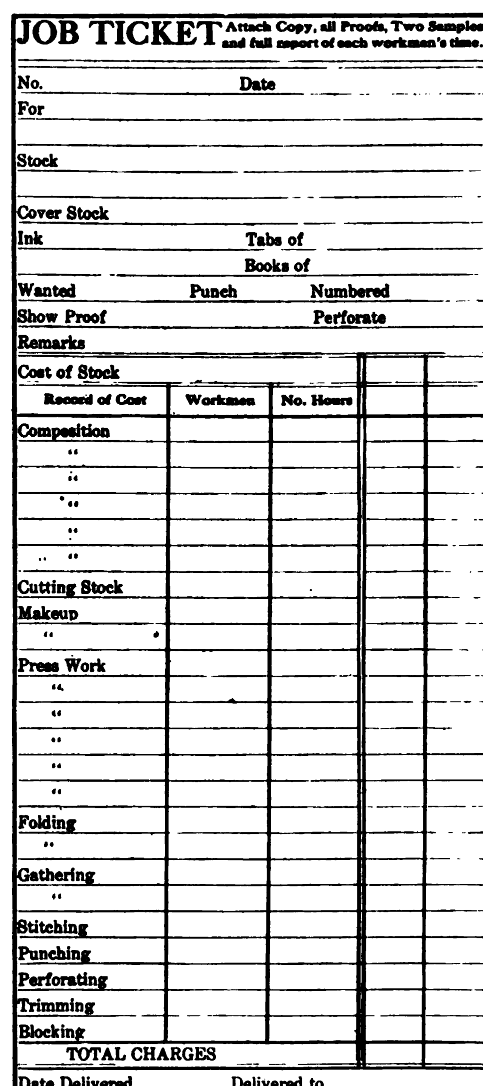
SHOP	SHEET METAL	WOOD WORK	PRINTING	ELECTRICITY	AGRICULTURE	MECH. DR.	INDUS. ART	
Date								
Instructor								
Mark								
Nomenclature								
WEEK	Processes	Processes	Processes	Processes	Principles	Principles	Principles	
I								
II								
III								
IV								
V								
VI								
Home Credit								
" "								
" "								
" "								
Instructor's Comment:								
Pupil's Comment:								
Physical Comment:								
Vocational Advice:								


Second Year
SHOP
Date
Instructor
Mark
Nomenclature
WEEK
Processes
Processes
Processes
Processes
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
Home Credit
" "
Instructor's Comment:
Pupil's Comment:
Physical Comment:
Vocational Advice:

Third Year

Shop	Shop	Shop
Date	Instructor	Mark
Processes	Processes	Processes
Home Credit	Home Credit	Home Credit
Instructor's Comment:		
Pupil's Comment:		
Vocational Advice:		

FRONT AND BACK OF STUDENT'S INDUSTRIAL RECORD.


JOB TICKET Attach Copy, all Proofs, Two Samples and full report of each workmen's time.
No. Date
For
Stock
Cover Stock
Ink Tabs of
Books of
Wanted Punch Numbered
Show Proof Perforate
Remarks
Cost of Stock

Record of Cost	Workmen	No. Hours		
Composition				
"				
"				
"				
"				
"				
Cutting Stock				
Makeup				
"				
Press Work				
"				
"				
"				
"				
"				
Folding				
"				
Gathering				
"				
Stitching				
Punching				
Perforating				
Trimming				
Blocking				
TOTAL CHARGES				

Date Delivered Delivered to

JOB TICKET FOR PRINTING CLASS.

for their consideration. We want them to know the physical conditions necessary to carry on various lines of work, the working hours, the education necessary, etc.

Before starting on a definite study of type occupations indicated above, we ask the boy to think of himself in relation to some line of work that he has already, in his own mind, selected for himself. Boys of junior high school age are beginning to think of themselves in terms of economic producers. They do not use this high sounding term, however, and they are not conscious of it. *Boys are thinking.* It is necessary not only that they should think but we want them to think with a definite object or goal in view. We ask them to select any occupation they think they would like to enter when they have to take care of themselves financially. Then we ask them to analyze this job and analyze themselves in relation to it. This is all done under the guidance of instructors. Before he finishes his analysis in practically every case he changes his idea regarding the occupation he has selected. If he does not, it would seem to me all work with him has been of very little value, as it will indicate that he has not gained a clearer insight than previously into the occupation he has selected.

It is impossible to indicate all the points covered in the "self analysis for self guidance." I have indicated just a few. After the boy has made the selection we help him to discover whether or not the occupation thus selected is constant, temporary, permanent, seasonal, skilled, or unskilled. We want him to know the physical and mental requirements necessary and then to size himself up to see whether he can meet these physical and mental requirements. If he cannot meet them, say physically, there is one of two things for him to do. Either he must be willing to put himself in the right physical condition, if that is possible, or he must change his selection. Many failures in this world can be traced to the fact that the physical makeup of the worker is not adapted to the work required. This is true with women as well as with men. We also want the boy to know the time necessary to make preparation to do things that he wishes to do. We then put it up to him to find out whether he is willing to pay this price. If he feels that financially he is not able to do it, then we want to show him how to help himself while he is preparing to enter the field he may have selected. We want him also to consider the working hours, whether it is night or day, or whether it is work that might require "split hours." We want him to be familiar with the income he may expect, the character of his associates, and his service to those associates. It is of great importance that he should consider what opportunities the occupation he has selected offers for advanced study and for promotion. We also discuss with him the legal protection afforded the worker. Some person may say this is going into the work too much in detail. We contend that it is not because we know the value of it. In the first place it connects the boy's school work with the world in which he lives. He will consider more carefully changes he may wish to make. He is less liable to seek "blind alley" jobs.

Following this analysis we get together the boys who indicate a desire to follow the same general line of work. If, for instance, several want to be electrical engineers, we get them together with the instructor in our electrical department who is a practical electrical engineer. He considers in detail with these boys this special line of work. We do the same with boys who would like to be printers or wish to enter any of the allied printing trades. Occasionally we find boys who want to be doctors or dentists. We advise them so far as we can. It is not uncommon at all at the present time to find girls who desire to become nurses. These girls, we place in touch with our school nurse. Much more might be written on this line of vocational advice but enough has been stated to show the general plan.

Let the junior high people, the academic teachers, industrial teachers, and principals consider the work first, last and always from the standpoint of the individual. The junior high school is a democratic institution, and will become to a still larger extent, a greater democratizing factor in our educational system. The industrial department is not a flavor or a sauce but is a vital part of the educational work of the junior high school. It is just as important in itself as is history or geography. It is a means that we use for helping and directing the boy to discover himself. It is a means and not an end in itself. The end of all education is that the individual may become an economic social asset and not a liability.

BLUE PRINTING

J. T. Van Stan, Williamson, Pa.

THERE is an art in making blue prints that can be attained only by experience.

As a rule we speak of blue printing being done on paper, and while this is true it is well to remember that other materials can be and are used in many instances. Chiefly of these other materials is linen, which is often used at present for especial cases, but for general purposes it is too expensive. Any plane surface may be used for blue printing, provided that surface is in good condition and the material will not change chemically the sensitizing solution.

Many grades of paper can be bought on the market, each claiming all the good points essential to good results in blue printing, and most of these papers have been found possessing all the good qualities they claim. Any white paper which possesses a high tensile value and has a semi-gloss finish is a good paper to use. A

high grade of excellent qualities should be used for special purposes since it will of course make a better print but for ordinary purposes its expense makes it impracticable.

The whole process as we picture it these days is largely dependent upon the machinery method. This method, naturally, has supplanted the old or hand process to quite an extent. It is essential, however, that the journeyman and student draftsman be familiar with both processes.

A brief description of sensitizing the paper by the machinery method is as follows: The roll of good quality paper (thin, medium or heavy of some desired width) is placed upon the rack at the front of the coating machine. From the rack it is simply run between two rotating rubber rolls, which stand in a vertical position. the finished side of the paper at all times in contact with the under roll since it is the one which applies the coating solution.

These two rubber rolls being forced tightly against each other by means of a spring device quite similar to that in the usual clothes wringer, insures against the paper slipping and permits it being drawn through evenly.

Just beneath the bottom roll, mentioned as the one which does the applying, a long pan, which contains the coating or sensitizing solution, is placed so as to permit this bottom roll to be always partly submerged in the solution.

Now after noting carefully the foregoing we come to this conclusion, that the chief feature of the machinery method of coating the paper, is simply squeezing or stamping the sensitizing solution on the surface of the paper, and not brushing or sponging.

After the paper passes through the coating rolls it is carried over electric dryers and thence made up into rolls of various quantities.

A coating or sensitizing solution for either the machinery or hand process, and one which has proved its worth from use is made up of the following chemicals:

1. ½ oz. citrate of iron and ammonia plus 2 oz of H_2O.
2. 1½ oz. iron and sodium oxalate plus 6¼ oz. of H_2O.
3. ¼ oz. potassium ferricyanide plus 4 oz. of H_2O.
4. ⅝ oz, oxalic acid (saturated).

It is advisable to use hot water and to dissolve the chemical in the order given. The container for the solution, should be of some opaque material or at least an amber glass vessel and should be kept at all times in a cool, dark place. Before any solution is used, it should be well shaken.

When applying the coating by hand, the sheets may be cut to size either before or after the solution is applied. This coating solution is more satisfactorily applied with a sponge than with a camel's hair brush, since with a sponge, excess solution can readily be removed from the paper, returned to the receptacle and used again.

When applying the coating allow the sponge to absorb the solution to its full capacity, then using the right to left motion, go over the surface of the paper until every particle of space is covered. After the excess solution is removed and the paper has lain in a horizontal position for a minute or so it is hung up by one edge to dry. Then after it is removed it is placed in a dark place, ready for use.

There are various forms of printing frame, but they all resemble that used in photography. The tracing or negative is placed in the frame with the sensitized paper in such a manner as to allow the light to pass through the negative to the coated side of the paper, then all are pressed tightly against the glass. The glass must be kept clean and free from moisture and have an equal bearing all over the tracing or negative.

The time for exposure varies from thirty seconds for a bright mild day, to eight or ten minutes for a very dull cold day. After exposure, the print is washed for five minutes and then hung up to dry. The exposure required when making a print from a Van Dyke negative is twelve minutes for a bright mild day to thirty minutes for a dull cold day.

To restore prints that have been overexposed (except in cases where the damage is too great) simply add enough bichromate of potash to the print wash to make the lines on the print a clear white. It is well to remember that another remedy for restoring an overexposed print is to wash it all over with the original sensitizing solution.

The process of blue printing depends upon two facts: 1. That ferrous salts are changed to ferric salts by light when in the presence of a reducing agent. 2. That potassium ferri-cyanide reacts with ferrous salts forming a deep blue.

In the mixture given, the citrate of iron and ammonia is the ferric salt. In the presence of oxalic acid, the reducing agent, it is changed to ferrous salt, i. e., its valence is changed from three to two. This ferrous salt when in the presence of water, unites with the iron and sodium oxalate and the potassium ferri-cyanide, thus forming the deep blue we get on the surface of the paper. The water also washes away the chemical not affected by the light.

Blue printing is done mostly by a machine invented for the purpose. This machine has a compartment fitted up with artificial light which may be an ordinary arc lamp, mercury tube, or any light which, in practice, is considered white light.

After tracing and blue printing paper have passed the exposing compartment they separate, the tracing passing out of the machine while the print passes to a washing tank. From this tank it is carried through the wringer to the dryer and finally to the trimmers.

A Project In Reed Furniture Weaving

L. F. Hyatt, Instructor in Advanced Cabinet Making,
McKinley High School, Canton, Ohio

NO kind of handwork is so adaptable to schools of various sizes as reed and fibre-cord furniture weaving. This is true because of the small expense incurred in equipping a room for the work, the very small amount of space needed, and the slight cost to each student if he is required to purchase his own materials.

The table lamp for which instructions are given in this article is of very beautiful design, very popular, and inexpensive. The cost of reed used in this lamp is approximately two dollars and a half. It stands about 20″ when completed.

The fibre cord may be used in this project instead of reed, as it is equally suitable and has the decided advantage of being used without soaking. Fibre must always be sized with art fibre sizing, stained, and shellaced.

Material Needed.

18′ of ½″ reed.
200′ of winding reed.
75′ of ¼″ flat reed.
40′ of No. 6 reed.
90′ of No. 5 reed.
¼ lb. of No. 3 reed.
¼ pt. of stain.
¼ pt. of shellac.
⅜″ No. 20 steel wire nails (not brads).
¾″ steel wire escutcheon pins for nailing braid.
1¼″ three penny steel wire nails.
Fixture for gas or electricity.

To avoid accidentally cutting the reed, *pruning shears* of *California* Model should be used. These and the *round nose pliers* can be purchased at any hardware. The *nail drivers* are a little on the order of pliers, and can be made by any good blacksmith, as these are not on the market. Some students use common long nose pliers, for a hammer cannot be used.

While making the lamp a close study of figures 1 and 10 will be found very helpful.

LAMP BASE.

I. Frame for the base.

Cut four pieces of ½″ reed 16″ long. These are to be used for the posts. From a piece of pine board ½″ thick cut two pieces 2¾″ square and bore holes, as shown in f (Fig. 3). Soak the 16″ posts until very pliable. Nail the four posts to one of the blocks, being careful to keep block a (Fig. 2) flush with the end of the posts. Eight inches from lower edge of the top block nail the second block b (Fig. 2) to all four posts, using 3 penny nails. Next, ⅜″ from the top block, and ⅜″ from above the bottom block, make a pencil mark on each post. At intervals of one inch mark the space between the two marks just made (Fig. 2).

II. Lattice Work.

Cut eight pieces of No. 6 reed, two for each side, 26″ long, and soak until very pliable. The lattice work is begun by finding the center of the 26″ pieces and crushing each piece with the round nose pliers 3/16″ each side of the center, thus making it possible to bend the reed at sharp angle. The crushed places of the first strand should be nailed to points 1 and a′, using a 3/16″ No. 20 wire nail. These nails have to be driven with nail drivers, as a hammer cannot be used in this space. The second strand is then fastened at 2 and a in a like manner. Extreme care should be exercised to crush the reed at the exact point that it is to be nailed. For convenience we will call the strand on the left x, and on the right y; the left strand of x, x1, and the right strand xr; the left strand of y, y1, and the right yr.

FIG. 1. THE COMPLETED LAMP.

Bring strand xr from 1 to b, crush and nail.
Bring strand x1 from a to c, crush and nail.
Bring strand y1 from 2 to b′, crush and nail.
Bring strand yr from a to c′, crush and nail.
Bring strand y1 from b′ to d, crush and nail.
Bring strand yr from c′ to e, crush and nail.
Bring strand xr from b to d′, crush and nail.
Bring strand x1 from c to e′, crush and nail.
Bring strand xr from d′ to f, crush and nail.
Bring strand x1 from e′ to g, crush and nail.
Bring strand y1 from d to f′, crush and nail.
Bring strand yr from e to g′, crush and nail.
Bring strand y1 from f′ to h, crush and nail.
Bring strand yr from g′ to 4, crush and nail.
Bring strand xr from f to h′, crush and nail.
Bring strand x1 from g to 3, crush and nail.
Bring strand xr from h′ to 3, crush and nail.
Bring strand y1 from h to 4, crush and nail.

Cut off ends allowing ¼″ for nailing. Proceed with the other three sides in exactly the same manner. Be careful to crush strands accurately so that the points of nailing will be directly opposite, on the two sides of the post. This will prevent curving of the posts, a difficulty which is likely to be encountered by the amateur.

III. Winding the posts.

Cut four pieces of winding reed 7 ft. 6 in. long, and allow to soak. Winding should always be started at the top of posts, proceeding from left to right. Nail a piece of this winding onto the edge of the block at the top. Slide this strand between the thumb and finger to see that it is not twisted. To avoid doing this each time it goes around the post it is well to slip the end through and

catch it between the index and middle fingers, holding it there, using the index finger and thumb to tighten. Allow the winding strand to go over the lattice work strand, where it is nailed to the post, once only, as this covers the nail satisfactorily. Often students fail to get the lattice strands fastened to the post exactly opposite each other and cannot catch it on both sides at the same time. In this case catch one, and the next time around catch the one on the opposite side. Tack the winding strand to the block **b** (Fig. 2) at the bottom, when finished, and proceed with the other posts.

Sometimes it is necessary to splice the winding material. This should always be done on the inside, where it cannot be seen. Place the new piece of the winding reed on the post and parallel to it, with the round side toward the post (Fig. 5) **b**. Continue winding with the old strand for about an inch, then catch both strands and twist them over. This brings the new piece on top, oval side out, with the old strand underneath, flat side out. Continue the winding with the new strand, thereby winding both ends underneath the winder (Fig. 5).

Table Lamp.

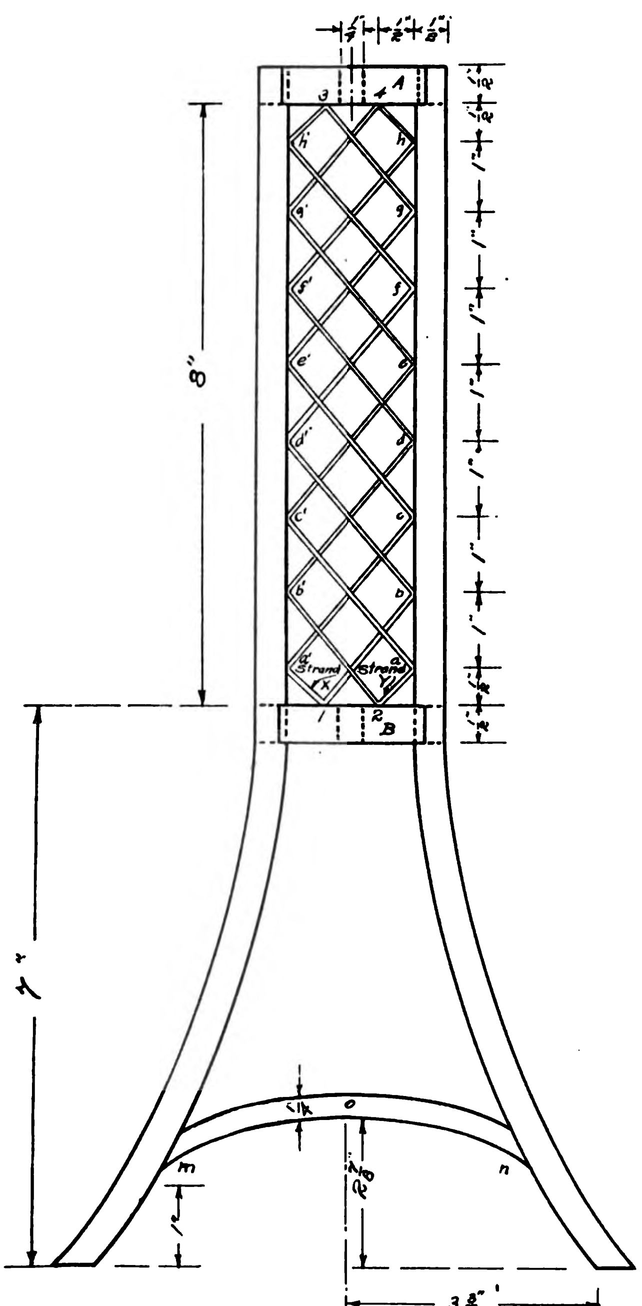


FIG. 2.

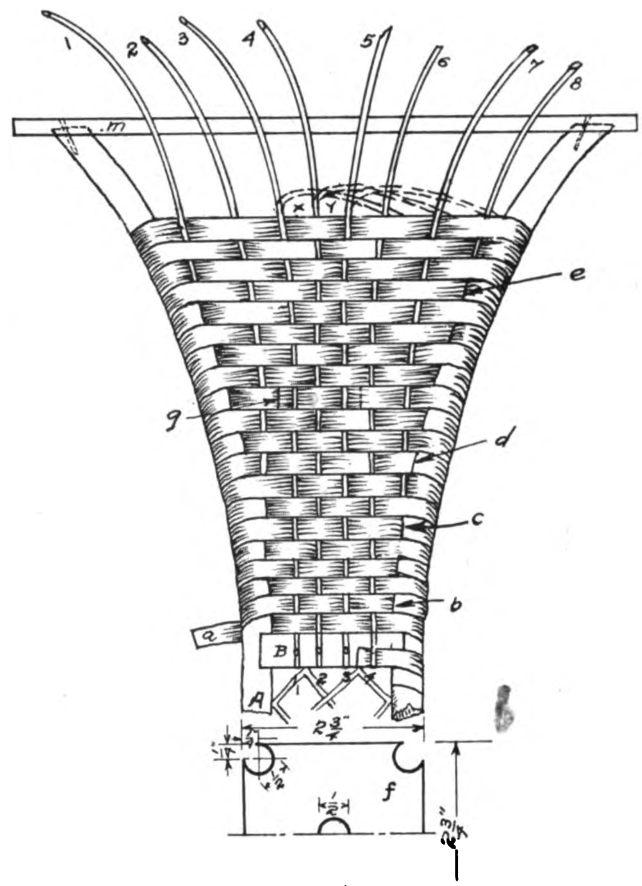


FIG. 3.

IV. Spreading the base.

Soak the posts up to block **b** until perfectly pliable. Obtain a thin board ½"x8½"x8½". Bore four holes 7¼" apart from center to center ¼" deep. Spread posts and insert in these holes, and nail securely from the bottom. While still wet the curve may be shaped. This board is merely a temporary base, **m** (Fig. 3). For braces cut four pieces of ¼" reed 8" long and taper the ends, as shown in Fig. 2, **m** and **n**. Soak braces and nail to the four posts, one inch from end of posts, using ½" No. 20 wire nails. The curve these braces take is not of great importance as it is covered by the weaving.

V. Weaving the bottom part of base.

Cut ten pieces of No. 5 reed 10" long. On three sides of block **b** (Fig. 3) nail three of these stakes, each equally spaced. On the fourth side nail four stakes, making 13 in all. **An odd number of stakes is always necessary where a single weaver is to be used.** Turn the top of the pedestal part of the lamp toward you. Place the end of a ¼" strand of flat reed behind the post A, at the left. Weave over stake 1, under stake 2, over stake 3, until once around, including the corner posts as stakes. The second time around the weaver will come under the corner posts at **b** (Fig. 3). Then it is necessary to wind the weaver once around these posts. This will occur every other time around. After weaving five times around, cut eight pieces of No. 5 reed 8" long, taper the ends, and nail to the sides of the posts at **c** (Fig. 3), being careful to get them exactly opposite each other, nailing with ⅜" No. 20 wire nails. Weave around twice, as before, ignoring the new stakes in the count. The third time around include the new stakes. Continue the over and under weave until you have woven around about 19 times from the top. Then cut eight more stakes 6" long, fasten as above, and weave down as far as it is possible to get the weaver between the place where the brace and the posts are nailed.

VI. Finishing the base.

Now crush each stake as close to the lower edge of the weaver as possible. With the top of the pedestal toward you start with the third stake from the corner post A (Fig. 3), on the left. Bring this stake, No. 3,

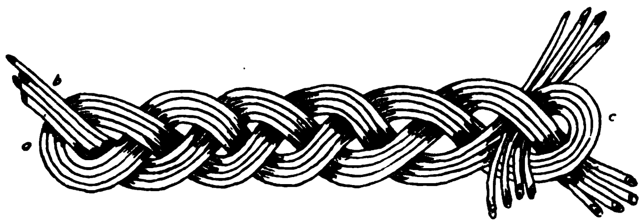


FIG. 4.

to the right, on the outside, and in front of stake No. 4 and 5 to the inside of the base, allowing it to remain back of No. 6. Then carry No. 4 in front of five and 6 and back of 7. Continue this weave until around the base to the last stake on the fourth side, ignoring the corner posts. Bring this stake in front of 1 and 2 and back of 3. Next bring No. 1 in front of 2 and 3 and back of 4 in the opening x, then bring 2 in front of 3 and 4 and

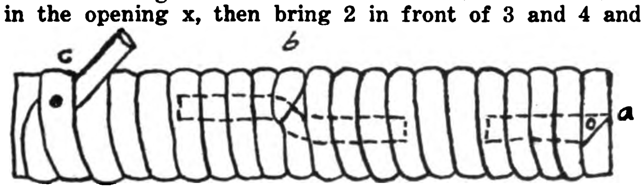


FIG. 5.

back of 5 in the opening y. This completes locking the ends of all the stakes and leaves all the ends inside of the base. Thin these ends with a pair of pruning shears being careful not to cut them short enough that they will slip from behind the stakes, to the outside of the base.

VII. Winding the feet.

Cut four pieces of winding material and fold at right angles (Fig. 5) a, allowing the end to be wound underneath. Begin at the bottom. Drive a nail into the fold to hold it securely. Wind up as far as possible under the finish just woven, fastening with a nail, c (Fig. 5). Proceed with the other three posts in like manner.

VIII. Making the braid.

The braid may be woven with any number of strands. In Fig. 4 four strands are shown, but for the base of the lamp only three strands are used. Cut three pieces of No. 3 reed 36" long and three pieces 72" long. Bend the 72" pieces in the center as shown in (Fig. 4) at a. Slip the 36" pieces (Fig. 4, b) over the bend, and braid as shown. After the braid is sufficiently long to go around and overlap about one inch, it is locked by bringing the three strands at the left around and under the strands they just went over. The ends may now be cut off so they do not project beyond the braid. This braid is nailed to place with ¾" steel escutcheon pins, nailing end c first.

LAMP SHADE.

The shade for which the following instructions are given is woven with an open top so that lamp may be equipped either with gas or electric fixture.

Cut four pieces of ½" reed 5¾" long. Miter these pieces at an angle of 45°. Glue the ends and nail together with a double pointed tack as shown at m (Fig. 6), and allow to dry.

Where the lamp is to be used for electricity a piece of soft wood ½"x5¾"x5¾" can be used instead of the frame, as no opening is needed. This will simplify the construction.

I. Frame for shade.

Cut 8 pieces of ½" reed 13" long and 4 pieces 2⅜" long. Measure one-half inch from the end of each of the 13" pieces and saw through ½ the diameter of these pieces, being careful to cut them on the same side at both ends. With knife cut the pieces out as shown at n (Fig. 6). Glue and nail these 13" pieces together. When nailing drive a 1¼" three penny nail through both pieces and into the end of one of the 2⅜" pieces. Do this with all four corners. Then make a second 13" frame, nailing to the same 2⅜" pieces, at the bottom. This completes the frame for the lattice. Next cut 4 pieces 7¾" long for K (Fig. 6). Bore a ¼" hole in each corner of the frame L (Fig. 6) at such an angle that the corner pieces K have the desired downward slope. Glue and insert K. Three-eighth inch No. 20 nails can also be driven through the

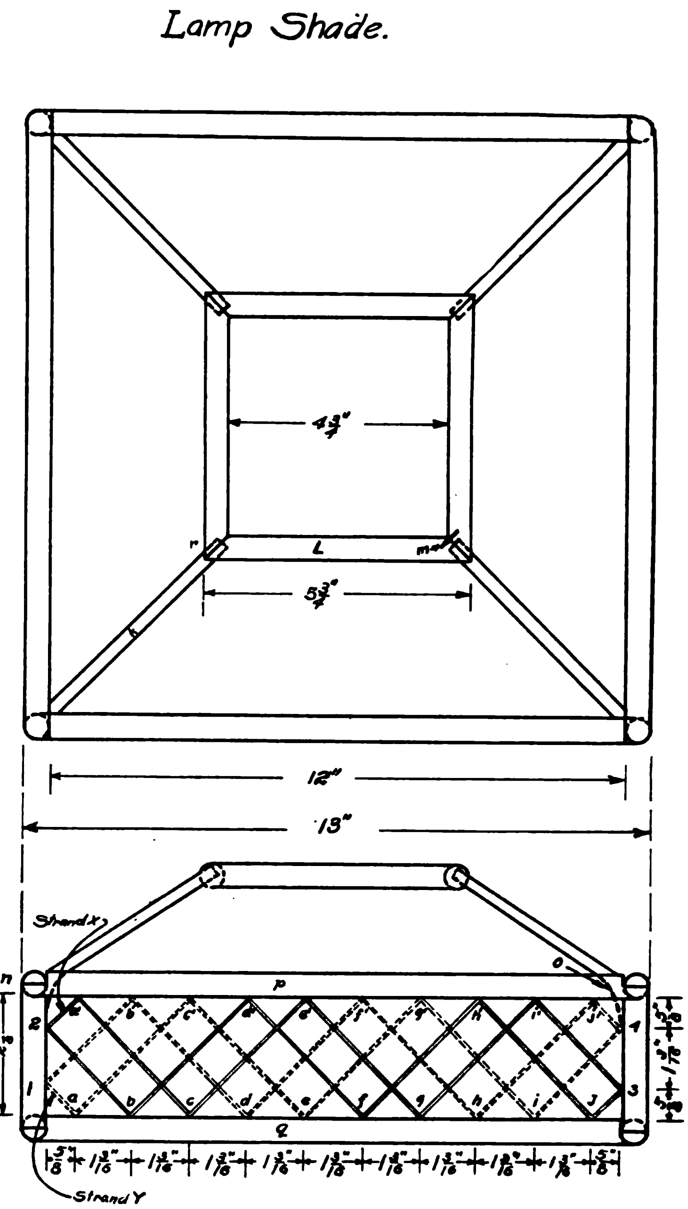


FIG. 6.

frame into K. Seven inches from frame L, crush K and taper from this point and nail to inside of lattice work frame, at O.

II. Holding frame in shape.

Before beginning the lattice work secure a piece of soft wood ⅛"x3⅛"x12". With ½" No. 20 wire nails nail this piece to the inside of rod p (Fig. 6); pull this rod straight before the nails are driven, then rod q can be nailed to other edge of same board. It is well to cut a piece of reed 2⅜" long and use it as a gauge between p and q after p has been nailed. When the lattice work has been placed in this side, remove the brace and nail to the next side.

III. Lattice.

Cut 8 pieces, two for each side, of No. 6 reed 36" long, for the lattice. Find the center of these pieces and ⅜" each side of the center crush with the round nose pliers. Call upper strand x and lower strand y (Fig. 6) and the right end of each r and the left end 1. Letter the rods p and q as in figure 6. Nail upper strand at 2 and a and bring strand xr from 2 to b, crush and nail, bring strand x1 from a' to c, crush and nail, bring strand xr from b to d', crush and nail, bring strand x1 from c to e' crush and nail, bring strand xr from d' to f, crush and nail, bring strand x1 from e' to g, crush and nail, bring strand xr from f to h' crush and nail, bring strand x1 from g to i', crush and nail, bring strand xr from h' to

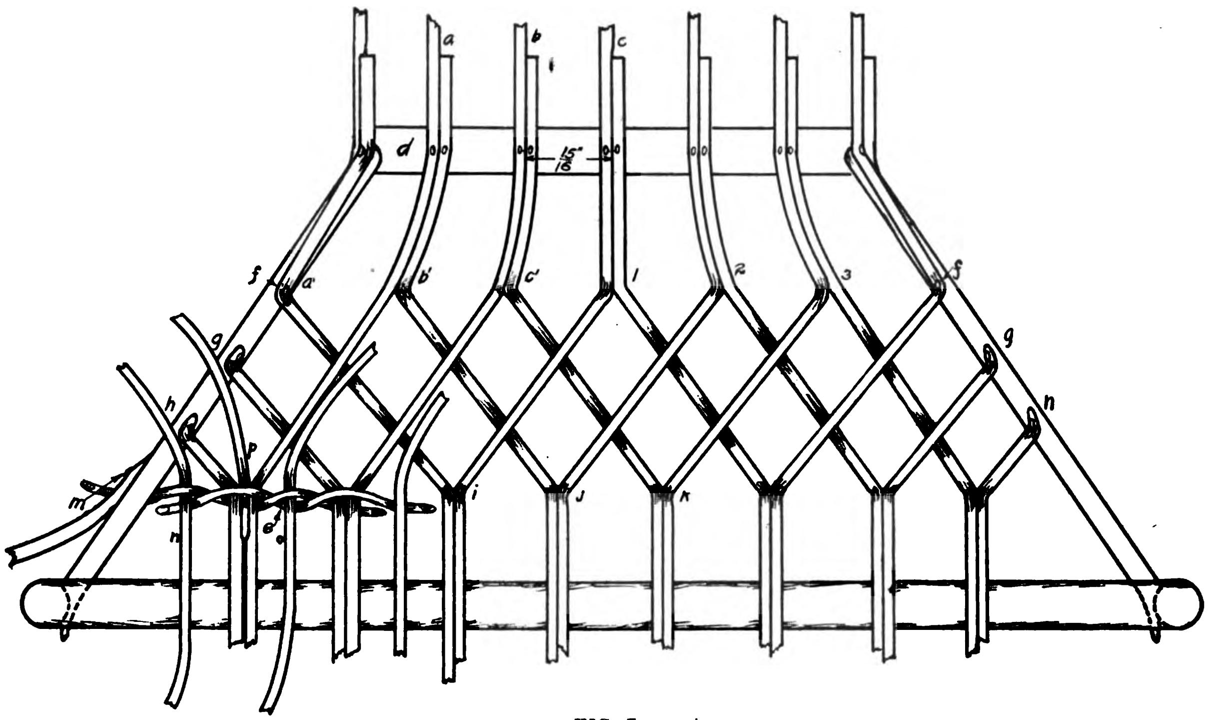


FIG. 7.

j, crush and nail, bring strand, x1 from i′ to 3, crush and nail, bring strand xr from j to 3, crush and nail.

This final nailing can be done neatly if the end of the strands are crushed at 3, then tapered, making a neat splice, laid together, and one nail driven through both strands, holding them securely.

Crush strand **y** as strand **x** was crushed and nail at 1 and a.

Bring stand Y1 from 1 to b′, crush and nail.
Bring strand yr from a to c′, crush and nail.
Bring strand yl from b′ to d, crush and nail.
Bring strand yr from c′ to e, crush and nail.
Bring strand yl from d to f′, crush and nail.
Bring strand yr from e to g′ crush and nail.
Bring strand yl from f′ to h, crush and nail.
Bring strand yr from g′ to i, crush and nail.
Bring strand yl from h to j′, crush and nail.
Bring strand yr from i to 4, crush and nail.
Brind strand yl from j′ to 4, crush and nail.
The other three sides are done in the same way.

IV. Winding.

About 130 feet of winding reed is required for the shade. Follow directions given for winding the posts in the end and nail stakes, where crushed, in pairs, to rod **d** (Fig. 7). Divide rod **d** into six equal spaces. Nail one pair of stakes on each corner so that the strands may be used on adjacent sides of the shade. Nail other five pairs to **d** at points marked.

VI. Pairing weave.

Taking two weavers of No. 3 reed, place one behind stake **a** (Fig. 7) and the other behind stake **b, above d.** The weaver to the left, in this case the one under **a,** each time is brought to the outside of the shade, over one stake and back of one, crossing on top of the other weaver at the right, as shown at **e** (Fig. 7). Continue this weave five times around the top, being careful that all stakes are vertical. It may be necessary to splice the weaver. To do this the old weaver is allowed to end behind any stake and the new is inserted behind the same stake. After the fifth time around cut the stake at the right of each, pair off even with the weaving **a, b, c** (Fig. 7), with the pruning shears. Crush the stake that remains, as close to the weaver as possible and finish off as the base was finished, (Fig. 3), in front of two and back of one. Beginning below the nails, or **d,** weave eight times around the lamp using the pairing weave and then crush all the stakes close to the weaver.

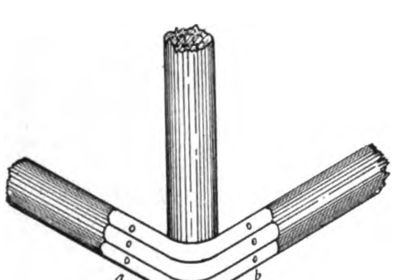


FIG. 8.

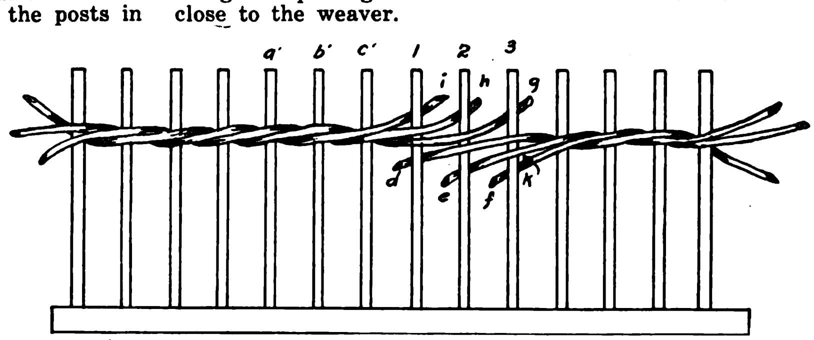


FIG. 9.

the base. When found necessary to splice this winding do it as previously explained, and shown in **b** (Fig. 5). The corners must be covered first, a process called strapping, used often in reed furniture construction. Cut 4 pieces of winding reed 3″ long. Nail these pieces at **a** and **b** (Fig. 8). These ends at **a** and **b** are then wound under, and thus the winding on the upright rods appears to continue to the bottom.

V. Nailing stakes for weaving top.

Cut 48 pieces of No. 5 reed 15″ long. Crush 5″ from

VII. Three Rod Coil.

Now we are ready for the three rod coil which is woven tightly against the weaving just completed. Figure 9 shows this in detail. Cut three pieces of No. 5 reed 7″ longer than the distance around the shade just even with the weaver. Place these three weavers back of three consecutive stakes as shown at 1, 2, 3 (Fig. 9), allowing them to project 2″ on the inside of the shade. Beginning with the weaver to the left, each weaver is brought successively in front of two stakes and back of one, crossing on top of the two weavers to the right. Continue this weave to the initial stake 1 (Fig. 9).

VIII. Reversing the Coil.

For convenience we will number the stakes to the left of the initial stake a, b, c (Fig. 9), and the two to the right 1, 2, 3. At this point the coil is to be reversed. Carry the weaver farthest to the right (the one passing back of c, figure 9), in front of 1 and 2 and back of 3. The weaver back of spoke b passes in front of c and 1 and back of 2, and the weaver at a passes in front of b and c and back of the initial stake 1. If this is completed properly the left hand weaver will finish behind the initial stake.

IX. Locking a Coil.

Behind spokes 1, 2, 3 (Fig. 9), a weaver begins, and one ends. Hold the weaver f, back of stake 3, inward or away from stake. Draw weaver g back of stake 3 and under the coil to outside between 3 and 4 at k. Hold weaver e back of stake 2, inward and away from the stake and bring weaver h behind the same stake, under the coil to the outside as before. Hold the beginning weaver d behind stake 1 inward as above and bring weaver i to the outside underneath the coil, thus locking it. Trim the ends on the outside and inside with a long sloping cut thus permitting them to lie close together.

X. Lattice Work.

Push the coil up very tightly so that when it is released it will cover crushed places. The stakes can then be separated permitting them to remain tightly together, above the coil. Crush and nail the strands on the corners at f (Fig. 7). Cut 8 pieces of No. 5 reed 10" long. Nail one reed at point g on K one inch below f and one reed on adjacent side of K at same point. Nail reeds in same manner at point h one inch below g. Cut four strands No. 5 reed 6" long. Nail at m, ½" below h at all four corners.

Separate strands at coil, allowing all strands coming from left to right to cross on top of strands coming from right to left. It is advisable for the amateur to tie these strands at i, j, k, etc., before crushing. This enables him to adjust lattice so that pairing weave e will run in a straight line. Then crush where tied, allowing stake to run parallel as shown in Fig. 7. We now have two rows of meshes as shown in Fig. 7.

XI. Putting in New Stakes and Finishing.

Cut 36 stakes 8" long No. 5 reed. These stakes, as m and c, are woven in as shown at e. with equal lengths above and below the first weaving. The pairing weave is used, to the outer edge of the frame. The only difficulty likely to be encountered is at the corners. Ignore corner rod K (Fig. 6), weaving around stake m instead.

FIG. 10. TOP OF LAMP SHADE.

Cut 36 pieces, No. 5 reed, 4" long and insert between the lattice strands, as shown at p, and beside the single strand on the corner m (Fig. 7). Be careful to force reeds down securely. Finish off the shade by bringing each of these stakes in front of two and back of third stake, all the way around, just as in the base, ignoring the corner rods, K. There remain the stakes projecting to the outside of the shade. Cut off the right stake of each pair close to the weaver, and crush the one remaining and finish off as above. Braid a two strand braid and nail on the shade to cover the nail heads on rod d. Wind rod K where exposed. After staining, shellacing and lining shade, the lamp is complete.

Block Printing For A High School Year Book

Rachel Skinner, Madison, Wis.

THE great expense of getting out a High School Annual nowadays is a grave question for most schools to solve. Materials are exceedingly high, and printing is enormously expensive. Because of insufficient funds, the average high school cannot afford more than three or four cuts in its year book, and these cuts are printed usually in only one color, the price of attractive, multi-colored plates being prohibitive.

For the past two years in the Champaign High School we tried the experiment of making and printing our own cuts. We had a Poco Proof Press, manufactured by Horace Hacker & Company, of Chicago, on which we printed all of the cuts which went into the year book. The process was exceedingly simple; the press was run by hand. When designs were selected, they were made backward, transferred to linoleum blocks mounted type high, and carefully cut and carved out. The subjects were simple, of course, with a minimum of detail or line drawing. Mass designs worked out ideally; since such work is coming into vogue more and more, I found another argument in favor of our experiment. We might have as many colors as we wished in our prints, though for each one we were obliged necessarily to cut a separate wood-block.

Last year my drawing classes worked on designs of every description. A list of subjects and suggestions was posted; this list grew as the work and the book progressed and gave pupils not in direct touch with the year book some idea of what was needed. I set a month as the time limit for our design contest, and at the end of that time submitted the results to two experienced instructors who chose the drawings best suited for the book. The contest idea worked well, as it always does; the honor of producing plates for the annual was sufficient stimulus to keep the entire class alert and vitally interested.

One member of the Senior Class had already been chosen art editor. When the blocks were selected and cut, it was his business to print them and to arrange them properly in the copies of the books, which were then ready to be bound. He could select as many assist-

DESIGNS ORIGINATED AND CUT BY THE AUTHOR'S CLASS.

ants as he chose, but the responsilibity was his.

Besides the financial importance of this experiment, there was opportunity in it for productive teaching of the most effective kind. There was splendid possibility for individual assignment and growth; the subject matter was flexible and each pupil could suit his tastes; the work was practical and therefore attractive. Combined with informal talks on printing, occasional visits to printing or engraving establishments, it could become effective perhaps in prevocational guidance.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

WORK EXPOSES INTEREST AND NEED.

It has been evident in the school art exhibits of the past year that the practice of freehand drawing as a process of art study in the schools, is essential and is maintained. This in spite of the assertion by some in authority who have insisted that pictorial art and the execution of it, are the concern of the professional artist only.

The trite and almost traditional assertion that "drawing is the common language through which art is expressed" has not yet been refuted, though it has been often denied by theorists in art education.

After several years of emphasis on the necessity of applied design and the complete execution of school projects in substantial material, the school exhibits are still in large proportion on paper and of paper. We consider this inevitable if not desirable. No school course in art can dispense with thorough training in graphical expression. No adequate school course in art can confine itself to the execution of the few projects that can be executed in substantial material during the limited time and under the limited facilities of the common school. As in written language, each project demands adjustment peculiar to the message and conditions under which the message is conveyed. This adjustment is design, whether applied to a sermon, a verse, a dress, or a chair, but it requires the vocabulary and synthesis of grammar and syntax, of drawing and composition.

During recent years we have noted a very great interest in announcements directed to advertise and pronounce ideas. Such work has been given the general name of Commercial Art. A large part of our school art has been directed to this interest. It has involved lettering and drawing in great variety. It has emphasized the desirable selection of tones, shapes, values, and colors that belong to both drawing and design. It has aroused the interest of thousands of pupils in graphical expression, who would have rebelled against formal lessons in drawing and lettering as presented a few years ago. It has, when properly directed, been the means of developing conceptions of fine art, and may be the means of developing future generations to the conception and execution of works of fine art.

This condition of interest should be significant to the art teacher. The art teacher must learn to draw freely, accurately, and effectively. The art teacher who cannot draw expressively is comparable to a tongue-tied teacher of English.

RESOLUTIONS.

The season of new resolutions for the teacher comes with the opening of school. With the past year in retrospect and a new year in immediate prospect, with revived energy and the courage that goes with it, we can be optimistic in our plans, and look forward to some decisive methods for improvement.

With the same equipment and environment of last year, we have a different group of children to deal with. When we recall how the children of last year appeared as so many peas in a pod on the first day of school, and how, after a few weeks of acquaintance, they proved to be individual in response and ability, the responsibility of the teacher comes to us with great force. Perhaps at the beginning of last year we conceived that a carefully planned course of work carried out to the letter and on schedule represented the greatest pedagogical accomplishment.

Now we know that a teacher who is not the interpreter of a course of study and the patient, inspirational friend of each and every child in the school, is far below standard. Now we know that the usual tabulated qualifications of a teacher's personality and preparation may mean much or little. The teacher should as a matter of course be neat, polite, pleasant of speech and manner, have executive ability, and know the subject matter of the courses taught, but if the teacher is not willing and able to help a variety of individuals develop their individual abilities, the work of this year will be a routine performance for pupils and teachers alike.

This is a type of teacher from which the schools might well be relieved. He belongs in the systematic, organized business office. He is a clog to the process of education, but may become a cog in the wheel of industry. He reduces his school work to a routine performance that carries off the program, regardless of the product and the product is human.

WHY NOT MAKE AN APPLICATION EFFECTIVE?

It is perfectly astounding how much time is uselessly consumed in the matter of applications and the attempts to shift from one position to another. A very large amount of this waste is due to the fragmentary, incomplete character of the information furnished by the applicant.

The seeker of a position should assume that his prospective employer is eager to know *all* about him. Sometimes, apparently, minor details decide a case in one's favor. Other times, the absence of certain minor details reverses the decision.

Anything that raises a doubt in an employer's mind is against the candidate. It is safer to make a frank statement of damaging evidence than it is to risk the surmises of an employer concerning doubtful points and evaded facts.

Many a position has been lost by the failure to furnish a photograph. The prospective employer prefers to know the worst rather than to risk the possibilities of the unknown factor. Other multitudes of applicants

have been disappointed by poor writing, careless composition, and misspelling.

Furthermore, an applicant need have little fear of tiring his prospective employer by a detailed statement of his training, experience, etc., if only he keep to the simple statement of facts, purposes, and ambitions. These are what the employer wants. If one can only state his qualifications fully, frankly, and sincerely, he will win a confidence and respect that will outweigh any petty defects or doubts which a frank statement may reveal.

The first communication of an applicant, therefore, should present complete information concerning his training, experience, health, family, church affiliations, purposes, ambitions, reasons for changing, etc., accompanied by a photograph, so that the prospective employer will not find it necessary to conduct a lengthy correspondence before arranging an interview. The first letter should secure an interview, if the applicant presents anything like adequate preparation and training for the position in question.

If these suggestions were followed, there would be far fewer disappointments and a remarkable saving of time.

THE TEACHER SHORTAGE.

Sometime ago the cry went out from pulpit, platform, and press that the teacher shortage was endangering the schools and the whole educational scheme. It was not just a scare. It was a real situation that threatened serious consequences. Attractions outside of the teaching profession were so alluring that many teachers yielded to the temptation. The amount of money received was larger at the first of the month and smaller at the last, but it was fascinating to see it passing through on its way.

Things have changed. Teachers are coming back in great numbers. Many of them are saying "It was wonderful while it lasted, but never again!" Some have found the expense of getting out and back again left them no better off financially. Sometimes they have found it necessary to go back to the schools with but little improvement, if any, in their positions.

All these changes and shifts and unsettled conditions have really had a most beneficial effect. Teachers needed the contact with things outside the schoolroom. They needed the broader vision which the commercial and industrial world furnished. They needed also to see a little more of the sordidness of things as contrasted with some of the idealism of the teacher, in order fully to appreciate the fineness and usefulness of the good, conscientious teacher.

Meanwhile, the teachers who stood by during the stress and storm have something to be proud of; and they have had recognitions and compensations both in genuine appreciation of their fellowmen and in increased renumeration.

There is still a shortage of skillful teachers. We suppose the supply will never be adequate and the skill will never be nearly enough perfection; but improvements are being made on every hand and the future looks somewhat brighter than for the past several years.

THE BACKWARD STEP IN ILLINOIS.

Under the prompting of reactionary influences, Illinois has done the expected thing in education, as usual. Indeed we have begun to expect the unexpected of Illinois, especially if the unexpected happens to be a reactionary, backward step.

Illinois has ham-strung the efforts to establish the part-time work by making the establishment of part-time schools entirely optional with the local communities. This means that even in some places where the work has already started in an attempt to prepare for the mandatory law, the efforts will be abandoned. Some of the lazy superintendents, penurious boards, and reactionary state officials will now wink and give a sigh of relief, while multitudes of boys and girls will go on in their hopeless tasks without a chance for improvement and with but indifferent, if any, interest on the part of schools and school authorities in their welfare.

This action means that the friends of this new type of education in Illinois must continue the fight. Much of the same ground will have to be fought over again that has been covered in the last decade, and the forces of reaction and obstruction will have to be overcome again.

The opposition to the establishment of part-time schools in Illinois has used the argument of economy and lack of funds. In the light of certain current charges and countercharges now filling the press, it would appear that Illinois has money for everything else except proper care of its schools and adequate educational facilities for its working boys and girls.

"I have been in the position of directing the work of men since I entered the Army at the age of nineteen. For seventeen years I was an officer in the United States Army, in the position of a commander, backed up in my authority by the Articles of War, and in position to compel obedience to my will without question; but I learned early in my career that the obedience of fear led to mediocrity and that to get the best out of my men I had to secure cheerful performance of duty. I had to obtain discipline and compliance with regulations through a desire on the part of the man to make his troop the best in the service. The only way in the world to secure that spirit is to make it possible for every man to know what you want. This means frequent talks, mutual understanding, confidence, and loyalty."—*Brigadier General Brice P. Disque.*

Concentration is the secret of strength in politics, in war, in trade, in short, in all management of human affairs.—*Emerson.*

Replacement Work For Blind and Partially Sighted Boys and Girls

Helen J. Coffin.

The placement of adult blind in Cleveland is done by the Society for the Blind. A very interesting account of their placement work appeared in the late summer of 1920 in *The Iron Age,* also in the *Literary Digest.* The boys and girls who want to go to work when they leave the sight-saving classes and the classes for the blind are placed by the Department for the Blind, a department of the Cleveland board of education, and followed-up in their work for as long a period as seems advisable in order to give them a good start.

The aim of the placement worker is try to get a certain job for a certain boy or girl according to his or her inclination and ability, and with due regard to the amount of vision each has. One boy with partial sight in one eye has been working successfully for the past two years as a baker's assistant on bread and rolls. Another boy with only slight vision was placed as an assembler in a factory which manufactures hot water heaters. The problem of a blind worker was new to this firm and the boy was employed on trial. He proved a satisfactory as well as satisfied worker, and six months after being hired, he was still "on the job" making good progress. Still another boy was placed as an assembler in a factory making stove fittings. He was among the last laid off and the first rehired. This boy has enough vision to take shopwork in evening school, and he will undoubtedly have an opportunity to operate a machine later and do higher grade work.

The young boys are not advised to start in on any machine, even if their vision permits this, owing to the fact that a boy is often careless and lacking in judgment regardless of how much he sees. Too much care cannot be taken to place the inexperienced and youthful handicapped person on a job which will not require him to overreach his physical ability at the out start. It has been found that when the boy does satisfactory work on the particular job, he has been given other jobs, generally more difficult than the first. The question for advancement then becomes a matter for the foreman to adjust. The favorable attitude and the good will of the foreman is second in importance to no one's in assuring the boy's success.

There are several causes contributing to the comparatively few placements made during the year by this department, first among them being the fact that few boys and girls leave the classes during the school year to go to work. Another is the fact that the total number of boys and girls who have left school and are already working is not large. With these boys and girls who are handicapped by lack of sight in varying degrees we feel it is not numbers which count, but rather the satisfactory solution of the problem of work for each individual.

Although no figures are available to prove this, it has also been felt that the first job which the handicapped boy takes is held longer than the first job of the boy of like ability without the handicap. Several things may account in part for this situation,—the handicapped pupil has had the advantage not only of educational guidance during his school years, but he has talked about his chances for work from a much earlier age than his seeing playmates. The problem is necessarily a more serious one to him since he will not be able to go out and compete with other persons for as great a variety of positions. This not only tends to make him search for his work with earnestness, but endeavor to keep it by industry and close application.

Occassionally there are cases of such inherent laziness that *every* job is too hard, and the boy is not satisfied with any kind of work for long at a time, but on the whole the person without sight is especially eager to *do* things,—even the school vacations are long and tedious to him.

Although the segregated group of blind workers within an industrial plant, is advocated by some, and has been successful, it is undeniable that excellent results can be obtained when young persons are placed individually among seeing competitors. In such a position they feel an added responsibility to do their work well. Moreover, many firms have been found willing to employ one or two workers where they were unwilling, or unable, to employ more. If persons are placed here and there, the handicapped workers are more widely distributed among the various industries, and more fields of work are open to them. In a city which has many industrial plants as Cleveland, this is also far more ideal from the point of getting the workers employment near their homes.

It is recognized that to get along with seeing workers the blind man or woman must be a good "mixer" and know how to get along with other people. In this connection it might be mentioned that such stress is being laid upon social education by this department in anticipation of the time when personality will count so much. not only in dollars and cents, but in happiness and helpful living. A pleasing personality, an easy manner in meeting people, ability to contribute to the enjoyment of others in some way are of inestimable value in helping a blind person to make a success of his work.

As has been mentioned above, vocational guidance is only a part of the work of the counselor in this department, educational and social guidance being considered as preparatory to the former. Not all the boys and girls go into the factory work. Some have taken up selling; one boy was employed two years in a wholesale creamery packing eggs and assisting in the delivery. One totally blind girl was employed in a paper box factory during the vacation folding boxes, and one was employed in a candy factory wrapping and packing chocolates. Both of these girls will complete their education before taking up permanent work.

Could every one of the processes of a modern industrial plant be offered for inspection by a competent person, who might judge of their possibilities for a blind worker, and such of these places as were adjudged suitable be filled by a blind person whenever there was such a person in the community, the employment of blind and partially sighted workers would be easily taken care of in any place, and to the mutual satisfaction of employer and employee.

It is a somewhat different and perhaps more difficult problem, requiring much skill and patience on the part of the adviser to place the person handicapped later in life. Vocational rehabilitation and satisfactory placement should be within the reach of every one handicapped by loss of sight. whether they served their country in the war, or met with the loss in some other way. The blind worker is not a dissatisfied worker, and all things considered is probably more satisfied than most of his seeing competitors, however just the cause of their grievances.

THE ART EDUCATION WE NEED.*

Leon L. Winslow, Specialist in Drawing and Industrial Training, University of the State of New York.

It is scarcely necessary to call attention to the importance of art as a controlling factor in the many industries where design is involved in construction as well as in decoration, and where the art element assures in a large measure, the salability of the product. In instances where salability is not dependent upon the aesthetic quality inherent in the product, art is employed in its advertising. As a result, art is coming to demand, more and more, the attention of manufacturers and of consumers. Consequently, renewed emphasis is being placed on art instruction in the schools.

Industry is interested in art primarily from the com-

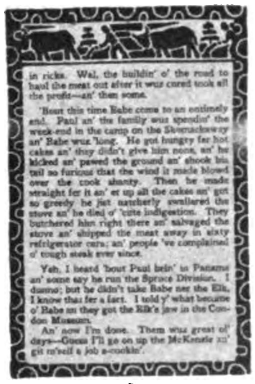
*From an address before The American Federation of Arts in Washington, D. C., May 20, 1921.

POSTERS PRODUCED BY ART CLASS, MADISON HIGH SCHOOL. MISS RACHEL SKINNER, INSTRUCTOR.

mercial side and it seeks to obtain skilled designers and craftsmen who can produce salable products. The manufacturer, all too frequently, hesitates to put on the market the most beautiful patterns which his designer produces, fearing that they may not appeal to the average buyer. He fails to recognize that public taste is often superior to industrial taste.

Educators are seeking to propagate and to perfect a higher type of art; they are teaching the public to appreciate it and trying to train designers and craftsmen to produce it. This will involve changes in art instruction and the combined efforts of all types of schools. To this end the elementary school must contribute its foundation in drawing, construction, and appreciation; the junior high school its appreciation and semi-specialized information and skill; the senior high school its deeper appreciation and more fully specialized information and skill; and the evening school its practical instruction for the worker employed during the day. In all types of schools much emphasis will have to be placed upon materials and their transformation into finished products.

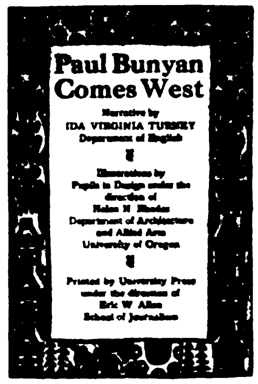
Back of the entire system of art education there must be set up a thoroughly effective system of teacher training capable of supplying directors, supervisors, and special teachers for all the various types of schools enumerated above. Scholarships must be founded to enable talented pupils to pursue advanced studies; our large manufacturers will have to be convinced of the value of establishing similar scholarships for the improvement of the designers and craftsmen already in their service.


in ricks. Wal, the buildin' o' the road to haul the meat out after it wuz cured took all the profit—an' then some.

'Bout this time Babe come to an ontimely end. Paul an' the family wuz spendin' the week-end in the camp on the Shemacksway an' Babe wuz 'long. He got hungry fer hot cakes an' they didn't give him none, an' he kicked an' pawed the ground an' shook his tail so furious that the wind it made blowed over the cook shanty. Then he made straight fer it an' et up all the cakes an' got so greedy he jist natcherly swallered the stove an' he died o' 'cute indigestion. They butchered him right there an' salvaged the stove an' shipped the meat away in sixty refrigerator cars; an' people 've complained o' tough steak ever since.

Yeh, I heard 'bout Paul bein' in Panama an' some say he run the Spruce Division. I dunno; but he didn't take Babe ner the Elk, I know that fer a fact. I told y' what became o' Babe an they got the Elk's jaw in the Condon Museum.

An' now I'm done. Them wuz great ol' days—Guess I'll go on up the McKenzie an' git m'self a job a-cookin'.


Paul Bunyan
Comes West
Narrative by
IDA VIRGINIA TURNEY
Department of English
Illustrations by
Pupils in Design under the direction of
Helen N Rhodes
Department of Architecture and Allied Arts
University of Oregon
Printed by University Press under the direction of
Eric W Allen
School of Journalism

The illustration above presents three greatly reduced pages from an artistic school publication, prepared under the direction of Miss Helen N. Rhodes, Professor of Normal Art, in the University of Oregon. The booklet from which the pages are taken is printed on rough hand-made Japanese paper and measures 7 x10 inches.

The stories which it contains are tales of the lumberjacks of the northwest, set down in frontier language by Ida Virginia Turney, of the Department of English.

The linoleum blocks were designed and cut by Miss Rhodes's students and are printed in a soft sepia brown.

As regards vocational and educational guidance, suffice it to say that art must be studied not only as it relates to painting and sculpture but especially as to its importance in advertising, costume, jewelry, printing and publishing, furniture, wall-paper, textiles, architecture and the decoration of interiors, in order that the pupils may become acquainted with the opportunities offered in the art industries for profitable and pleasurable employment.

This re-organization of courses in elementary, high and normal schools is only the beginning. There must, sooner or later, be established a group of schools for the industrial arts which eventually will be capable of training an adequate number of designers and craftsmen to plan and create the kind of industrial product which the American child is already being taught in the public schools to appreciate and to demand. I am convinced that European training can not develop the kind of industrial art that America must produce, if she is to hold her own in the international competition for commercial leadership which is already upon us.

The ideal type of industrial art school can only be realized through the unified efforts of all agencies concerned. It is not enough that industry, art, and education should strive for it; they must strive *together*. And back of all must ever lie the controlling force of public opinion. A campaign in which the schools, the museums, the art associations, the industrial organizations, and the labor groups all worked together harmoniously, would win for the United States of America the place in the industrial world to which the quality of her citizenship justly entitles her. The greatest need at the present time is for leadership in this movement.

PUBLICATIONS.

News Bulletin. Vol. 1, April, 1921, Pennsylvania Society for Vocational Education. William P. Loomis, Editor-in-Chief, Harrisburg, Pa. A monthly publication issued in the interest of vocational education within the state.

Mr. Uel W. Lamkin retired on July 1, 1921, as director of the Federal Board for Vocational Training in charge of Soldier reeducation. The office will not be filled by a new appointment.
large educational aspects of the work of the board and several government officials commended Mr. Lamkin's work and wished him well in his return to private life. Mr. W. I. Hamilton, chief of training relations, outlined the problems to be met in vocational education, Mr. H. L. Brunson explained the work of the department of industrial relations, and Mr. R. T. Fisher contributed a word of appreciation for Mr. Lamkin's fidelity to the board.

The Department of Superintendence of the National Education Association will hold its 1922 convention in Chicago.

PORTION OF EXHIBIT OF GRADE WORK IN NEW BRUNSWICK SCHOOLS. MR. L. R. PARK, INSTRUCTOR.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

GATE LEG TABLE.

Lee M. Klinefelter, Norfolk, Va.

This table is a simplified form of the old-time gate leg table. The design has been modified so as to be within the reach of boys in the first year of high school, and in some cases in the upper grammar grades. When well finished, either in stain and varnish or enamel, it makes a very attractive piece of furniture, considering its straight lines, and simplicity of construction.

The stock required is such as is available in any manual training shop, and no turning or special tools are required. While mortise-and-tenon construction is shown in the drawing, dowel construction can, of course, be substituted.

The two pivot legs should be made slightly longer than the others, to allow for length lost in cutting off at the pivot. Methods for laying out the top will be found in any mechanical drawing text.

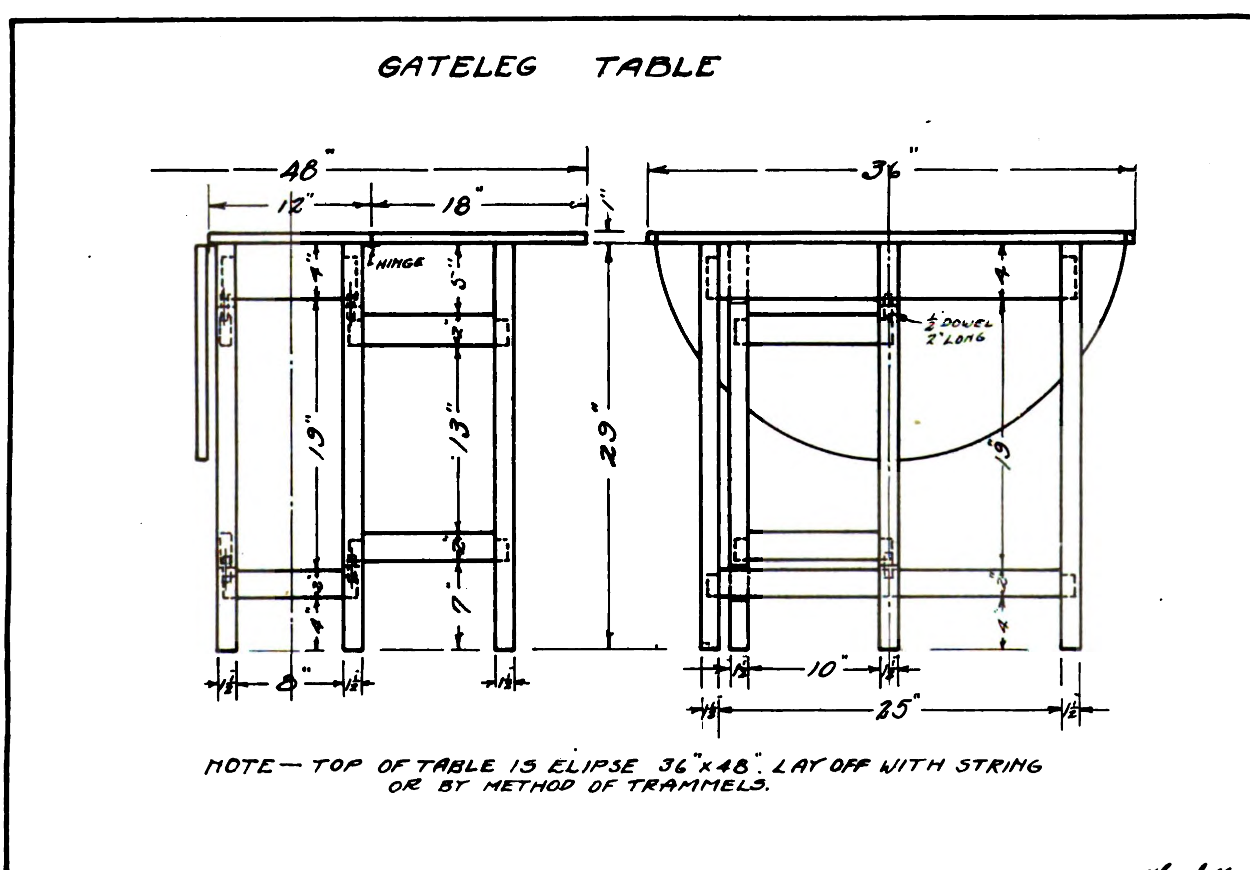
Both top and bottom of the drop leaves should be finished, as the bottom shows when the leaves are dropped, and also to preclude the possibility of warping in such comparatively large unsupported surfaces.

COMPLETED TABLE.

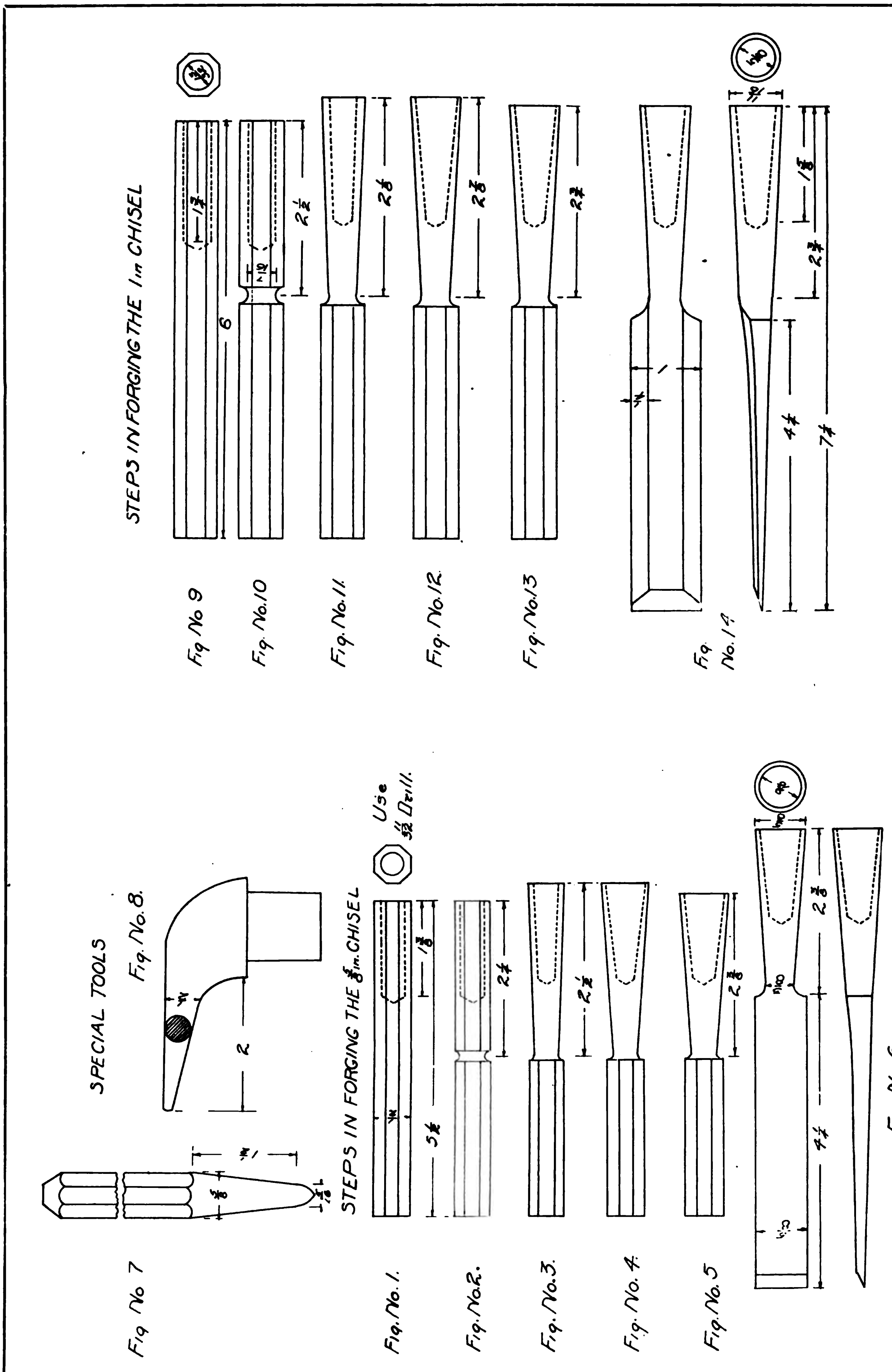
FORGING OF SOCKET FIRMER WOOD-WORKING CHISELS.

Jay F. Knowlton, Junior College Shop Instructor, Hibbing, Minn.

The wood working chisel is perhaps one of the best forging problems I have tried in the eighth grade. While the making of it requires skill to a small degree, it is simple; and the finished problem seems to satisfy the boy for the effort he has put forth. Then it is not one of those long-dragged-out problems of which a boy becomes tired, before it is completed. A boy knows what



DETAILS OF GATELEG TABLE.



STEPS IN FORGING.

a chisel is, he has used one, knows its value, and if he does not long to own one, his father perhaps does. As a problem in the school shop, from the instructor's standpoint, it has some very good points. It combines the different operations learned in the iron work, with perhaps the addition of the tool steel drilling and drifting. The forming of the socket is a new operation to nearly every boy, and one on which time can well be spent. The blade must be kept straight from the tip to the smaller end of the socket. The tempering is important and can be easily tested by cutting end grain oak, using a mallet.

The regular grade of octagonal cast tool steel can be used, but better results can be obtained by using steel of a higher grade. The three-quarters and smaller chisels can be forged from $\frac{1}{2}$-inch stock, and when cut $5\frac{1}{2}$ inches long it will make a chisel with a $4\frac{1}{2}$-inch blade. If a longer blade is wanted, the stock will have to be cut accordingly. This length works best with the boy as it is far easier for him to keep such length straight while forging and tempering.

The steel after being cut to size, must be thoroughly annealed by heating to a bright red, and placed in air slack lime for several hours to cool. This is necessary if one expects to drill the hole shown in Fig. No. I.

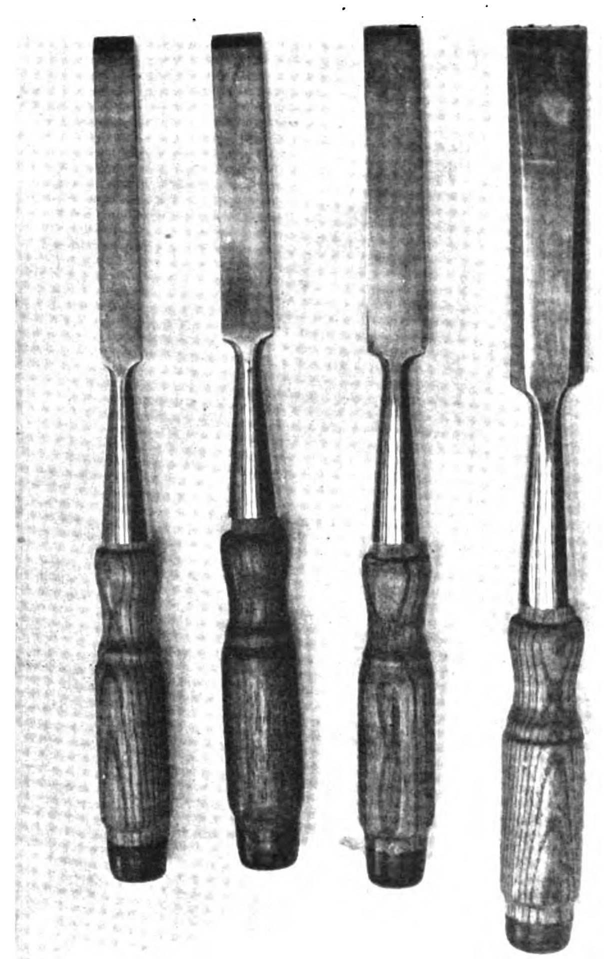
After the steel has cooled in the lime, it is removed and one end is filed square, on which is marked the exact center. This is center punched and the hole is now drilled with the 11/32 drill to a depth of $1\frac{3}{8}$ inches. This of course must be drilled straight, and, if no better device can be had for drilling, a square block of wood with a straight hole drilled in it to hold the steel, may be used. If the drilling is not kept straight, it will be impossible to put a wooden handle in the chisel straight, when finished.

Now with the $\frac{1}{4}$ inch top and bottom fullers, fuller $2\frac{1}{4}$ inches from the drilled end, to $\frac{3}{8}$ inch thick as shown in Fig. No. 2. Then with the use of the special tool shown in Fig. No. 8, draw the edge of the socket out a little thinner, and forge down to shape shown in Fig. No. 3 and 4. The socket is now complete, except the finishing of the inside of the socket. This should now be done by placing the octagonal end in the vise, and while the socket is red hot, drive the drift shown in Fig. No. 7 into the socket, until it is shaped to the required size. Notice that this will, of course, make the socket end of the chisel a little shorter. Now heat the socket, place the drift in the socket again and straighten on the anvil.

You are now ready for forging the blade. It is here that great care should be used to prevent overheating the steel. Draw the blade to size slowly and evenly, remembering, that while a low heat may take a little longer it will in the end pay, in the form of a keen cutting chisel of an even temper. After the blade has been forged to size, it is well to take a few dull red heats and with a perfect faced hammer smooth the blade, never striking after the color has disappeared. The blows should be even, light, and fast which tends to refine the grain of the steel. Now heat to the same dull red, and place in the lime to anneal, which will remove any forging strains.

The chisel is now ready for rough grinding, after which, the straight side of the blade is draw-filed until it is perfectly straight and you are free from a rounding, cutting edge. It is now buffed all over from the 40 to the 120 grade wheel after which it is ready for tempering.

To temper, heat the blade to a cherry red and quench in oil. The blade should be hardened two-thirds of the length. It should now be examined to see if it warped in hardening. If it did, it must once more be heated and straightened. If it is still straight, the temper can be drawn over a hot iron to the first shade of blue. The socket and top part of the chisel should be drawn until all temper is gone. The chisel can now be ground and tested on the end grain of hard oak and its condition as you can harden at, the less liable the chisel is to warp. A much better chisel will be had if the forging of the blade is all done at a low heat, as stated. If you overheat or forge at a very high heat, you must expect an open grain steel and a chisel that will not stand up at any temper.



SOME OF THE CHISELS MADE IN THE AUTHOR'S CLASS. HOME MECHANICS CLASS.

The one inch chisel is forged (Figs. No. 9 to 14) in the same manner, except use $\frac{3}{4}$ octagonal steel in place of the half inch. The socket must be a little larger, to take the second size handle. The taper in this size socket is the same as in the first one. So it is only necessary to drive the drift to the full depth, which will give a $\frac{5}{8}$-inch opening. The one inch chisel has a bevel as shown in Fig. 14 which can be made by roughing off on an emery wheel and then finishing with a file. Draw file in finishing so as to remove all unevenness.

The special tools to be used are very simple and can be made without a great amount of trouble. Fig. No. 7, or the drift, is forged from the regular $\frac{5}{8}$-inch octagonal tool steel and the taper must be perfect if the handles are expected to fit firmly. After forging it can be placed in a lathe and smoothed, or the same results can be had by grinding on the flat side of an emery wheel. It will be well to have a regular chisel socket to try your drift in, to see if the taper is perfect, and to locate the depth to which the drift must be driven to give the size required. This tool does not require tempering.

The special tool shown in Fig. 8 is forged from square steel. Fuller and draw out the shank to fit into the hole in the anvil. Draw the other end to a round taper as shown, then heat, place in anvil and bend to shape shown. This does not need to be tempered.

A very good scratch-all can be made by forging a socket as shown and then drawing the part used for the chisel blade into a round taper point.

RACKS FOR HANDSCREWS AND CLAMPS.

Herman Hjorth, Director of Technical Work, Roman Baldorioty de Castro Graded and Technical School, San Juan, Porto Rico.

The two racks for handscrews and bar-clamps, designed by Mr. J. C. Armstrong and the writer, have been found to be very convenient and efficient. They have the advantage that any handscrew or clamp may be taken out or replaced rapidly, without removing or disturbing any of the others. Furthermore, the racks take up very little room and hold the handscrews and clamps securely.

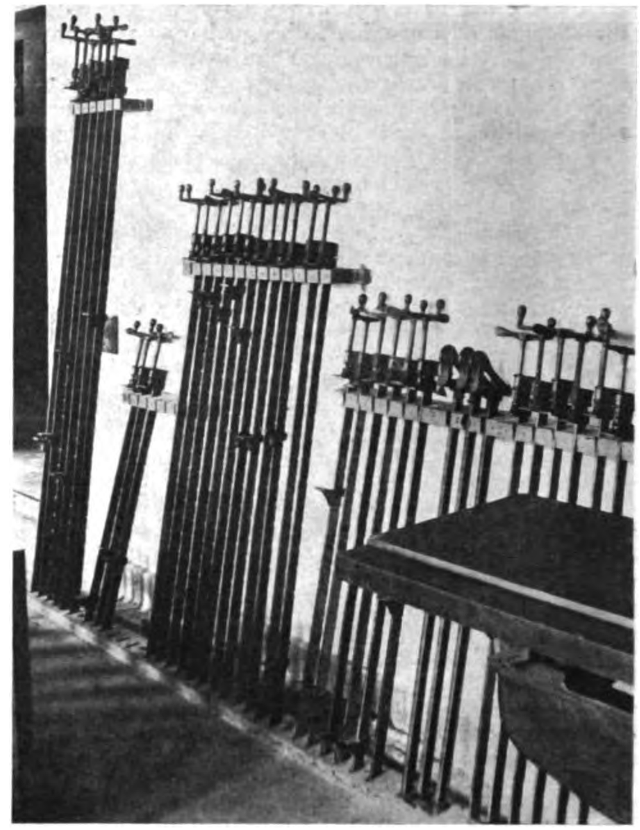
Racks of this kind should be built to accommodate the exact number of handscrews and clamps belonging to the shop, so that the different sizes can be put in the places provided for them, and so that the number may be easily checked.

HARDWARE CABINETS.

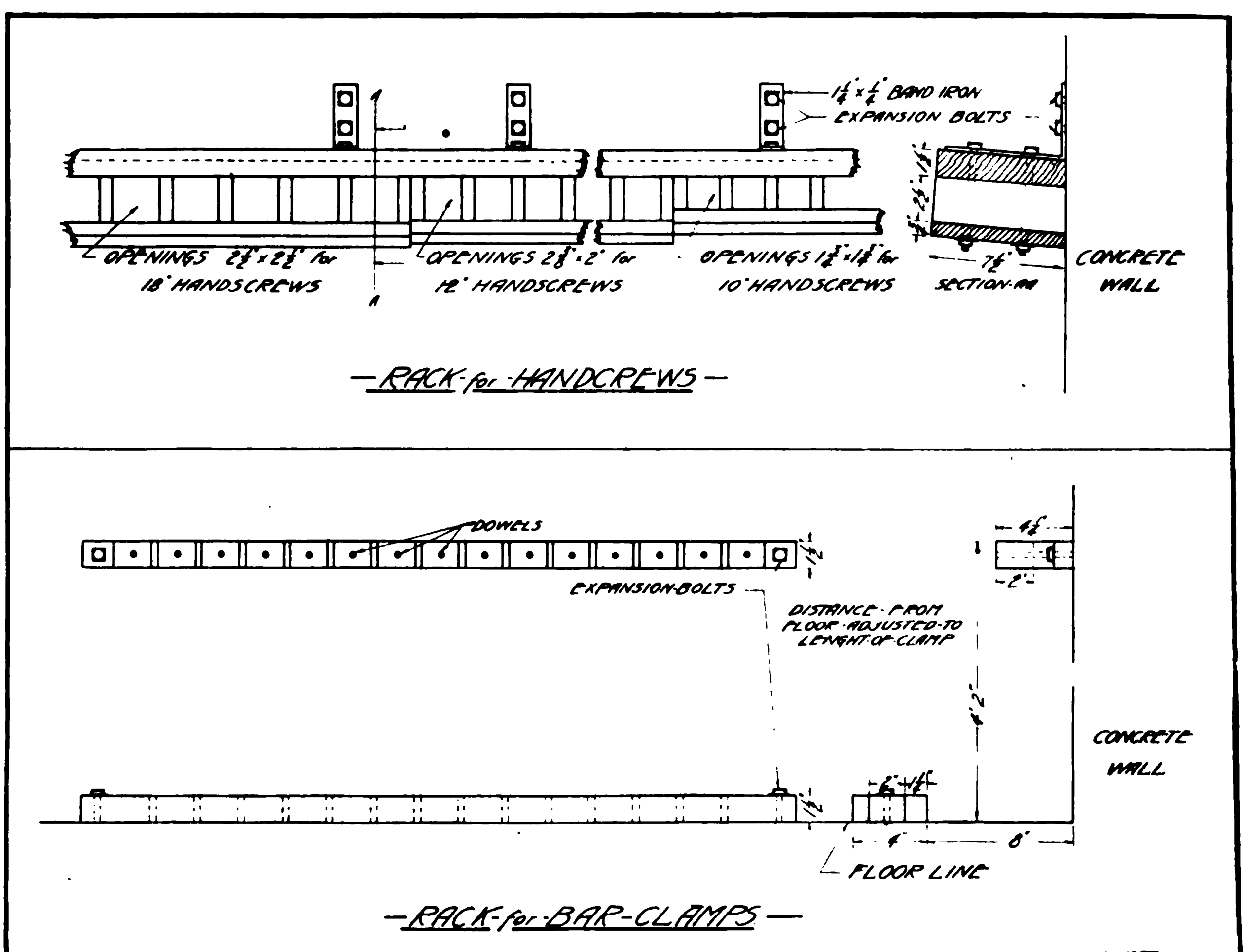
Arthur F. Ryan, Trenton, N. J.

In all up-to-date hardware stores you will find the stock kept in cabinets with metal drawers. To keep near this practical method and to do away with a lot of small boxes made of wood, we have made some cabinets in our eighth grades, using galvanized and black iron for the drawers with soft wood fronts and partitions.

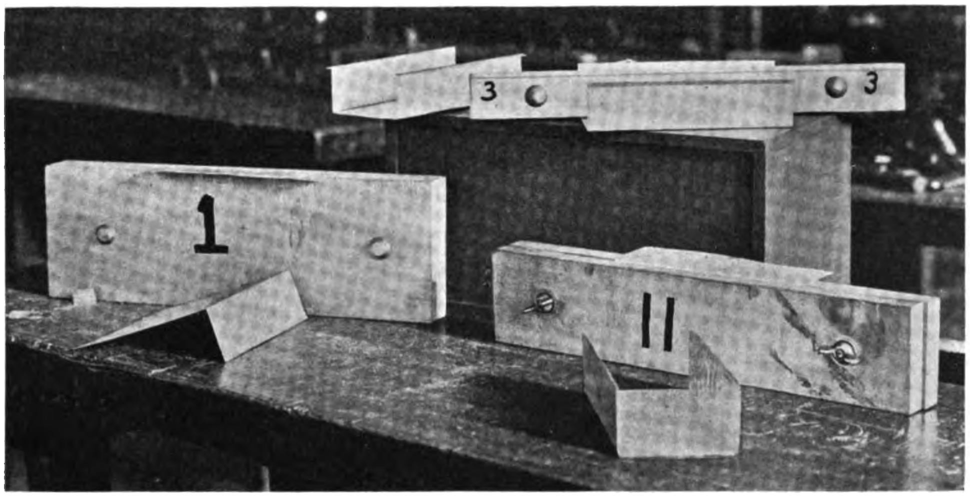
We planned the cabinets so as to save material. Two sizes were selected as standard. One with drawers 12" deep, 3½" wide and 1¾"high. The other 8" deep, 3½" wide and 1¾" high. The iron was cut from sheets No. 26 gauge, 8 feet long by 24" wide. The sheet gave us cuts without waste and made our cost three cents for small size and four cents for large size. After being cut with hand shears, each piece was placed in double block Number One, which is 5½" wide. Then in block two which is 3½" wide. Then to block three which is 1¾" wide. The top edge or "turnover" should be ¼" providing all pieces were



COMPLETED RACKS



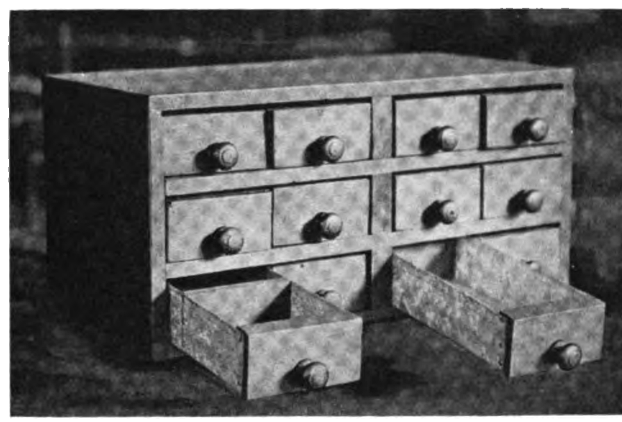
DETAILS OF RACK FOR BAR CLAMPS.



METAL PARTS OF DRAWERS AND JIGS FOR BENDING THE SAME.

8" wide in starting. This "turnover" is hammered flat. The iron was purchased at six cents a pound and a sheet weighs about fifteen pounds.

The front blocks were rabbeted 1/15" deep by $\frac{1}{2}$" wide on the bottom, when in strip form, and same carried around ends by being put in the mitre saw. The fronts and partitions were stained, then nailed in place with No. 16 flat head nails. Side clearance of $\frac{3}{8}$" for every two drawers was allowed in cabinet frame and $\frac{1}{4}$" clearance for top and bottom.



A CABINET READY FOR USE.

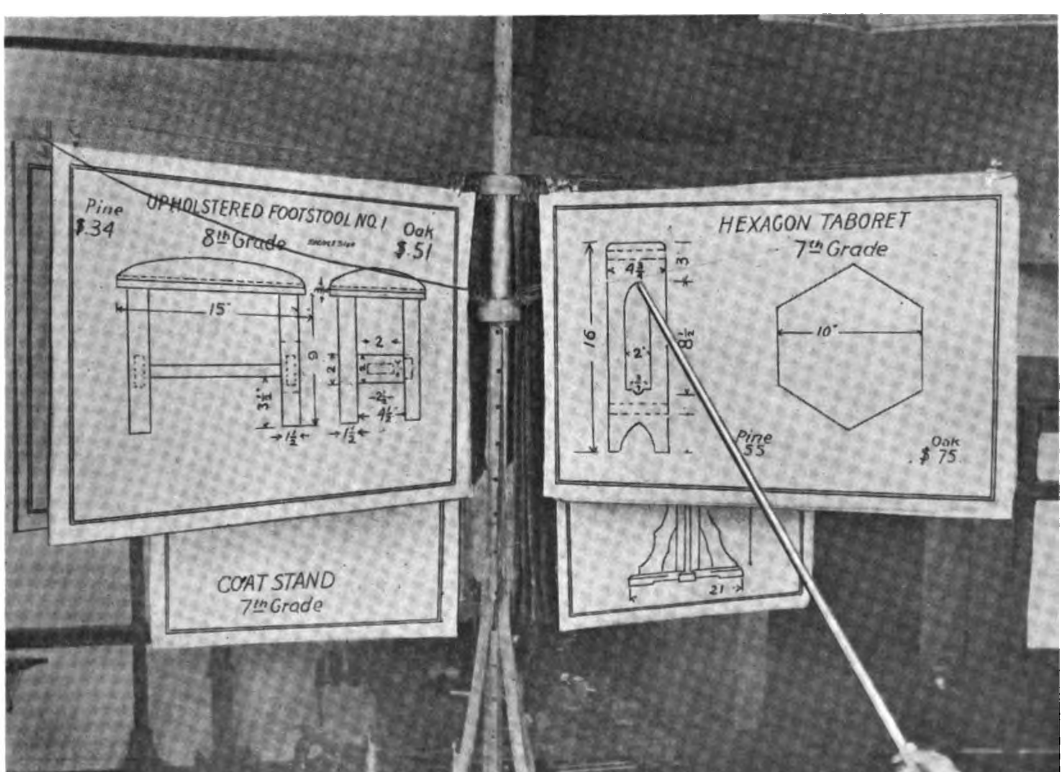
PRESENTING CLASS PROBLEMS.

W. S. Morgenthaler, Great Falls, Mont.

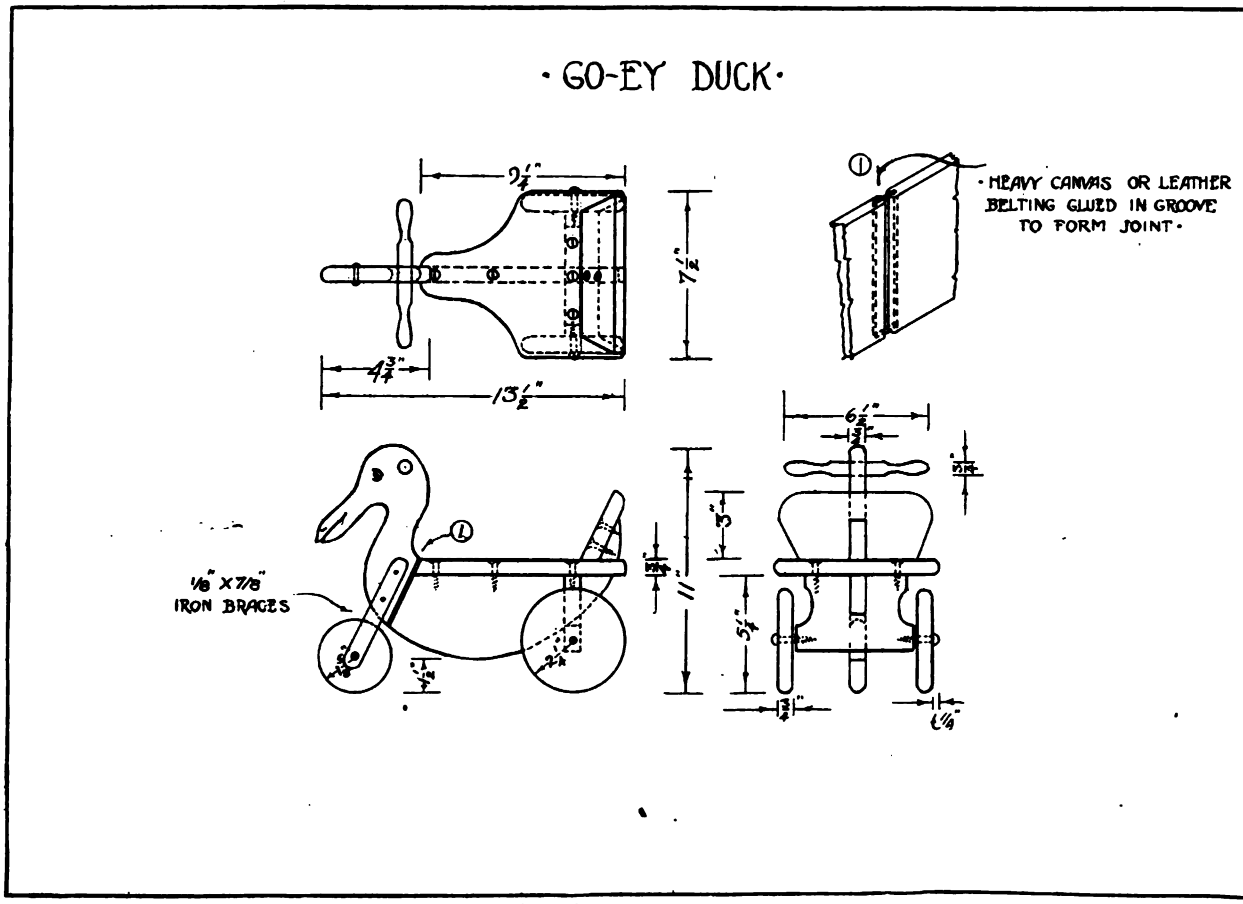
As a method of presenting class problems to pupils, the following has been used successfully for seventh and eighth grade work in the Great Falls schools. Instead of the customary blue prints and blackboard drawings, projects are drawn on large sheets of tough wrapping paper. These are similar in size to blackboard drawings, being 24 by 36 inches and are made with lumber crayon. The accompanying illustration shows drawings mounted on rack where they are easily accessible.

The advantages claimed for this plan are as follows:

First—The drawings are always accessible and are permanent.



THE DISPLAY RACK AND TYPICAL DRAWINGS.



DETAILS OF GO-EY DUCK.

Second—They have all of the merits of blackboard drawings for classroom discussion and being of a permanent nature can be kept for ready reference.

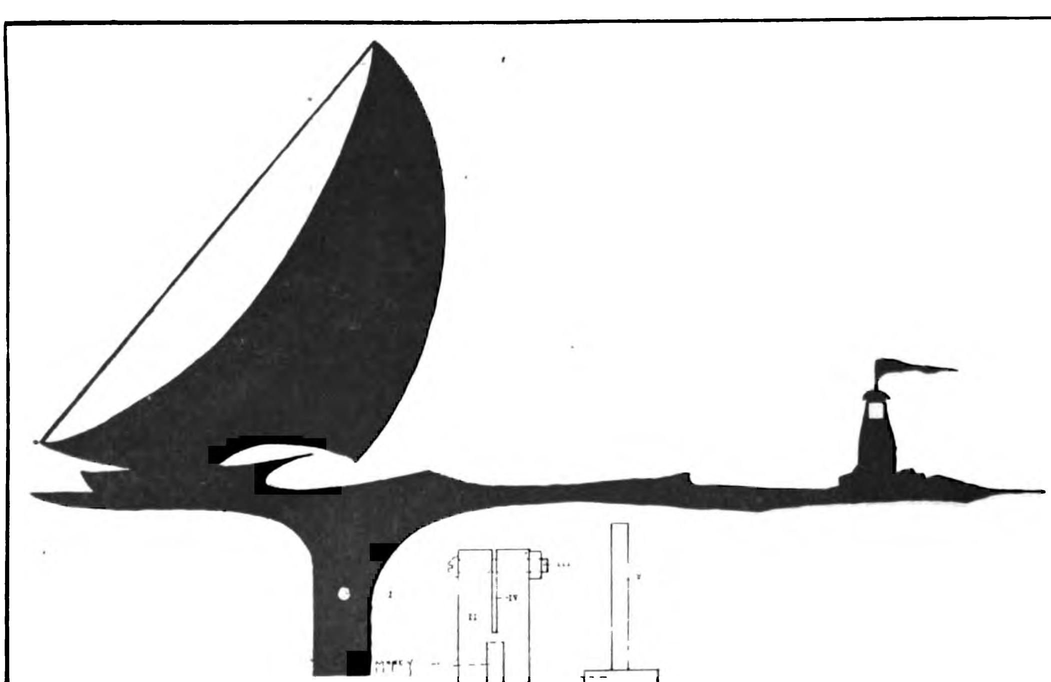
Third—With this scheme they can be kept up-to-date and a number of plates of the same project are not needed as with blue prints. A popular project can thus be preserved for the use of others with a few minutes' work.

Fourth—Another factor not to be lightly considered is that a correct atmosphere, created by the presence of full-sized wall drawings about the room. In seeing the finished article worked out from these drawings the pupil receives a knowledge of value beside that acquired from his own project.

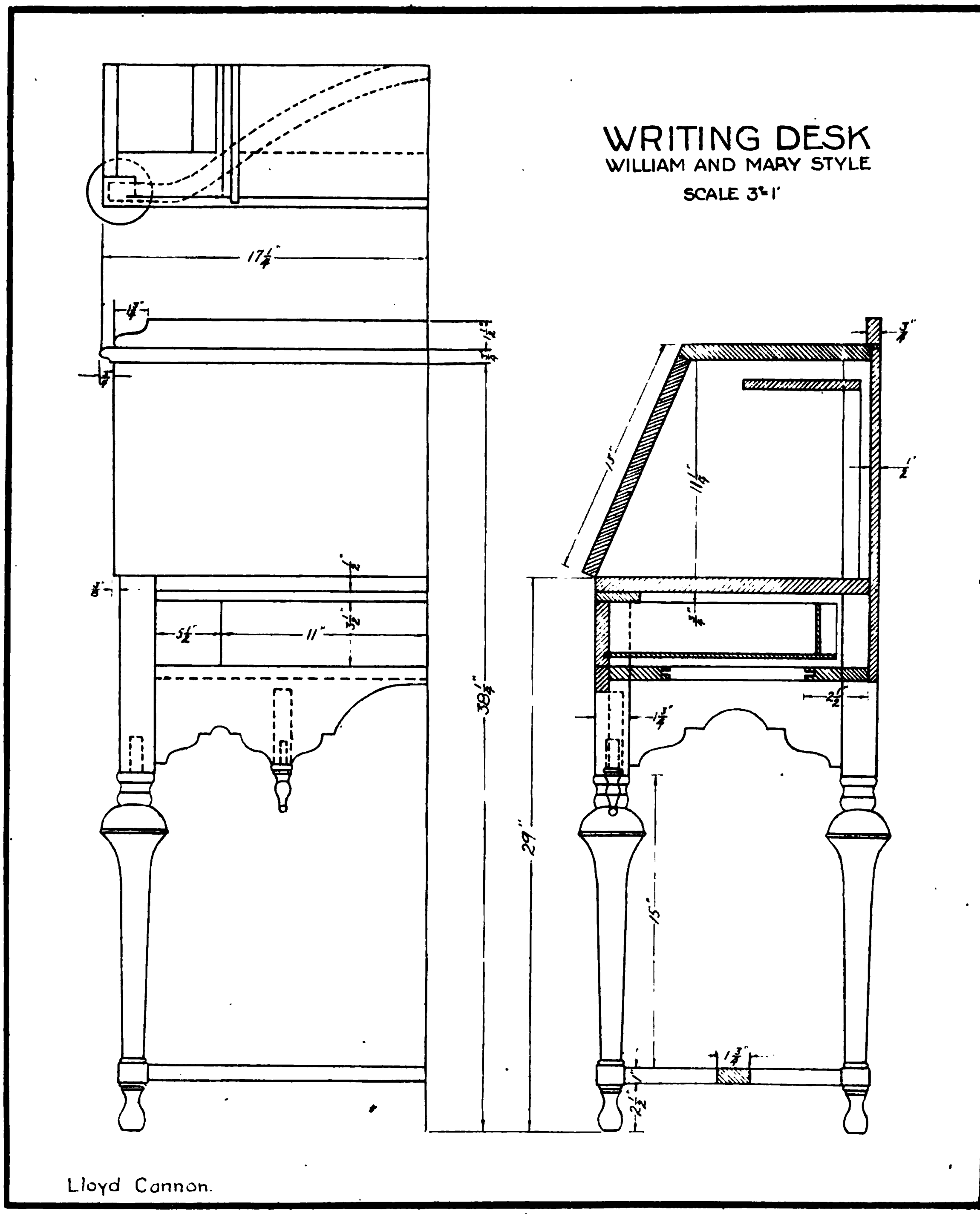
GO-EY DUCK.

H. R. Porter, Bellingham, Wash.

This is a variation of the much used "kiddie kar" and is designed to meet the requirements of the very little boy or girl. The wheels should be made of some hard wood but the body may be made of pine. As shown in the drawing a piece of canvas or leather belting is glued into grooves to form a flexible joint. This forms a very strong hinge arrangement and is not as unsightly as strap hinges would be. It may be painted in naturalistic colors.



THE WEATHER VANE.



DETAILS OF WRITING DESK.

THE WEATHER VANE.

B. G. Morey, Ottumwa, Iowa.

A very interesting weather vane may be made of a sheet of zinc, brass, copper or thin wood. The metal ones are more serviceable. The metal should be of about 15 or 20 gauge in thickness. After the design is drawn or traced on the metal, saw out the vane. The edges should be smoothed with a file and sandpaper. A short section of broom handle is used for the holder of the vane. The hole (VII) swings over the pivot (V). The section of the broom handle should be extended to allow the hole (VII) to be the length of the pivot (V). This pivot may be made of a very large nail. The top of the pole supporting the pivot is shown in (VI). The saw cut (IV) holds the vane and after slipping in place firmly bolted in place by running the bolt to the opening (I).

Practically the same directions are used for the vane of thin wood. The cut (IV) should be wide enough to carry the extra thickness of wood. Three-ply basswood is the best material for a wooden vane. The wooden vane may be painted dark blue for the ocean, black for the hull, white for the sail, gray for the rocks, dark gray for the lighthouse and red for the flag.

A WRITING DESK.

F. R. Love, Director of Manual Arts, Stockton, Calif.

This writing desk was designed and made by a student in the advanced cabinet making and turning classes. The design is a modification of the well known William and Mary and was made by a Japanese boy in his second year of work. The desk as well as the chair were completed in one semester.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Wood Refinishing.

219. Q:—(1) I have the job of refinishing a house this summer and would like some practical information in regard to, (a) revarnishing floors, (b) refinishing linoleum, (c) painting windows, porches, etc., (d) painting porch floors exposed to weather.

(2) I have an old car to finish. I should like to know the proper method of finishing an automobile from the bottom up, including the removing of the old varnish.

(3) What grade of varnish would you recommend for a "rub finish" suitable for manual training purposes?

A:—(a) **Revarnishing Floors:**—If in poor condition remove old varnish by use of varnish remover; hot solution of Gold dust using two pounds to a twelve quart pail of boiling water applied with a broom or scrubbing brush and allowed to remain long enough to thoroughly soften the varnish. The destroyed varnish and dirt should be washed up thoroughly with plenty of hot water and allowed to dry. It should be sponged over with vinegar to neutralize any free alkali remaining in the cracks. In three days the floor can be filled with a tinted Silex filler which should be allowed to harden at least forty-eight hours. The floor may then be given a coat of Pratt & Lambert No. 61 Floor Varnish or equal supplied by local markets allowed to dry at least a week, sandpapered lightly to remove the gloss and revarnish. The floor should be allowed to dry at least a week before using. Do not use any shellac under varnish for floor work.

(b) **Refinishing Linoleum:** — Thoroughly scrub or wash up the linoleum by using one cup of Gold dust in twelve quart pail of hot water, allow to dry at least two days, then wash with vinegar and allow to dry thoroughly. It may then be varnished as for floor work omitting the filler.

(c) **Painting window sills, etc.:**—Old paint should be thoroughly scraped off down to raw wood and primed with a good commercial undercoater and sanded smooth. It should be then given one or two coats of good white enamel since this will outwear ordinary paint a great many times.

(d) **Porch Floors:**—Porch floors should be painted with deck or porch paint prepared especially for this purpose and if such are not available may be made from white lead and oil to which turpentine and varnish have been added to make a very hard drying gloss paint. I have often found that the addition of one-half pound of flake litharge in the undercoater, at least has very beneficial effect. (one-half pound litharge per gallon of prepared paint.)

(2) Refer to the April, 1920, issue of the INDUSTRIAL-ARTS MAGAZINE, page 146.

(3) I find that Keystone Co. Degrah, Pratt & Lambert Rubbing No. 110 are very good varnishes for shop use. In trade school practice where school supplies and furniture are manufactured, I believe that Pratt & Lambert No. 61 is by far the best material for both rubbing and polishing coupled up with extreme durability. Murphy's Univarnish is also very good.—Ralph G. Waring.

Electric Stove.

229. Q:—We are making an electric stove and would like to have the names of the manufacturers who could supply us with heating units for this purpose.

A:—The following manufacturers can supply you with units for an electric stove:

General Electric Company, Schenectady, N. Y.; Driver-Harris Co., Harrison, N. J.; Hoskins Mfg. Co., Detroit, Mich.; Electrical Alloy Co., Morristown, N. J.; Cutler-Hammer Mfg. Co., Milwaukee, Wis.

Sun-Dial.

228. Q:—I am desirous of securing information relative to the laying out and correct placing of sun-dials?—H. C. R.

Material for the making of sun-dials may be obtained from the following books and magazines:

"Bond's Scientific American Boy," $2, Munn & Co., New York City; "Gatty's Book of Sun-Dials," $10, Macmillan Co., New York City: "Thonger's Book of Garden Furniture," $1, John Lane Co., New York City; "Underwood's Garden and Its Accessories," $1, Little, Brown & Co., Boston; "Spackman's Timepiece of Shadows," $1.50, W. T. Comstock, New York City.

"Eaton's My Home-Made Garden Pool," Country Life, April, 1920, Doubleday, Page & Co., Garden City, N. Y.; "King's Garden Sun-Dials," International Studio, Sept., 1916, John Lane Co., New York City; "Sun-Dial for Garden Wall," Craftsman, August, 1916, Craftsman, New York; "Robinson's Making a Sun-Dial," Country Life, Feb., 1917, Doubleday, Page & Co., "Riblet's Sun-Dial for a Colonial House," Garden Magazine, Jan., 1917, Doubleday, Page & Co.

IDENTIFICATION OF OAK WOODS.

Over fifty species of native oaks assume the proportions of trees, and about twenty-five are used for lumber. After the oaks are cut into lumber, there is no means known to the U. S. Forest Products Laboratory by which they can be identified as to exact species. By examination of the wood alone, however, it is easy to separate the oaks into two groups—the white oaks and the red oaks; and for most purposes, fortunately, it is not necessary to classify them further. The oaks all average about the same in strength, but those in the white oak group are much more durable under conditions favorable to decay than those in the red oak group.

The white oak group includes true white oak, swamp oak, bur oak, cow oak, post oak, overcup oak, and chestnut oak. The red oak group includes true red oak, yellow or black oak, scarlet oak, Spanish oak, Texan oak, black jack, water oak, willow oak, and laurel oak.

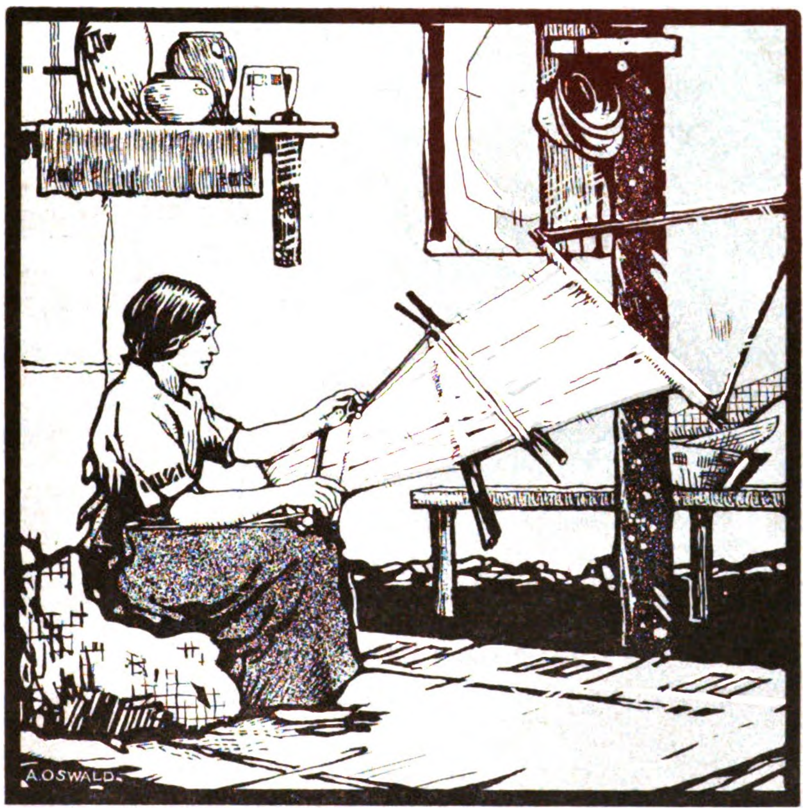
The color of the wood is a ready but not absolutely reliable means of distinguishing the white oaks from the red oaks. Red oaks usually have a distinctly reddish tinge, especially near the knots. The wood of the white oaks is generally a grayish brown; but occasionally a reddish tinge is found in white oak lumber.

For more accurate identification it is necessary to examine the pores of the wood. These will be found as tiny holes on a smoothly-cut end surface, the largest being visible to the unaided eye. They are not of uniform size thruout each growth ring, but are considerably larger in the wood formed in the spring, decreasing in size rather abruptly towards the summerwood. The large pores in the springwood of the heartwood and inner sapwood of the white oaks are usually plugged up with a froth-like growth called tyloses, and those of the red oaks are open. This feature, however, is not so reliable for classification as the character of the much smaller pores in the summerwood.

To tell for a certainty whether a piece of oak belongs to the white or red oak group, cut the end grain smoothly with a sharp knife across several growth rings of average width. With the aid of a hand lens examine the small pores in the dense summerwood. If the pores in this part of the growth ring are plainly visible as minute rounded openings, and are not so crowded but that they can readily be counted, the wood belongs to the red oak group. If the pores in the summerwood are very small, somewhat angular, and so numerous that it would be exceedingly difficult to count them, the wood belongs to the white oak group.

Educational Work of the Commercial Museum of Philadelphia. By Charles R. Toothaker. Bulletin No. 13, 1920, U. S. Bureau of Education, Washington, D. C. The Museum was organized on June 15, 1894. It is governed by a board of trustees of prominent businessmen and is supported by appropriations from the city, from the state of Pennsylvania and by subscriptions from manufacturers and merchants in the United States for special service along commercial lines. A very active and important educational work is carried on under the department of exhibits, the main object of which is to teach the rising generation the basic facts and principles which underlie modern industry. The pamphlet describes the several educational activities under the headings of study of exhibits, daily lectures, special lectures for teachers and others, loan lectures, and school collections or miniature museums, which are given free of cost to schools for class use. Among the exhibits are rubber, wheat, iron, coal, wool, corn, cotton, turpentine and a number of the producing industries.

THE INDUSTRIAL-ARTS MAGAZINE



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"YANKEE" No. 1530

INDUSTRIAL-ARTS MAGAZINE

Volume X OCTOBER, 1921 Number 10

Industrial-Arts and Prevocational Education in Our Intermediate and Junior-High Schools

I. MEETING PRESENT DAY NEEDS

A. H. Edgerton, Indiana University

IN keeping with the rapid changes in our social and industrial development, there are growing evidences that an increasing number of schools are seriously attempting to prepare boys and girls to meet the new demands for efficient service as members of families and of vocational and civic groups. Perhaps the most noticeable indication of this step has been the decided change in the *purpose, content,* and *method* of the work now offered both in industrial courses as a means of general education and in classes for specific vocational education. Although industrial arts, manual arts, or the socalled prevocational courses, and strictly vocational classes do aim at entirely different objectives, nevertheless these are closely related in so far as a complete program for a democratic education is concerned. In fact, the success of vocational education partially depends upon the previous understanding, insight, and general acquaintance which the pupils have had with the actual conditions and relationships in the industrial and commercial world. Of unquestionable importance is also the additional fact that the future wage-earner is a consumer as well as a producer; that a program for public education which neglects to help individuals to consume intelligently and utilize the hours of leisure wisely is decidedly undemocratic.

Experience has taught us that the instruction for those who are preparing for direct entrance into industrial pursuits or skilled trades, or are returning for trade extension work, should help them to acquire a high degree of manipulative skill or add to their technical efficiency. Recent reports from intermediate schools and junior-high schools on successfully tried units of industrial work, some of which will be given later in these articles, likewise show a generally accepted belief that adolescent pupils might well gain some knowledge of a reasonably wide range of typical industrial activities by having first-hand information and experience in important processes of manufacture, transportation, and commerce as a foundation for their life work. In the former case, the success of the individual depends largely upon skill and knowledge as these relate to quality and quantity production in some form. In the latter case, *the "self-finding" period demands appreciative insight into a sufficient number and variety of representative experiences to try out, discover, and develop ability for understanding and doing, as well as managing and supervising industrial work.*

Current Tendencies in Seventh, Eighth, and Ninth Year Courses.

The junior-high-school or intermediate-school *plan for selecting and organizing as large a variety of profitable experiences as possible and practicable is favored by over 123 of the 379 schools* which have recently reported from 21 different states on the industrial activities now being offered to their seventh, eighth, and ninth grade pupils. Table I shows that practically no changes are claimed in the purpose, work, and method of the industrial subjects in less than ten per cent of these socalled reorganized departments. However, these same data show that over 67 per cent of the 379 schools in question not only include notable changes in their upper grade curricula but also encourage the deferring of definite vocational choices as long as is possible. The majority of the school organizations which favor specialization in particular differentiated courses, either at the beginning or at the end of the first term in the seventh grade, are located in cities of over 200,000 population, indicating that the chief reason why nearly one-third of these schools now foster courses which are optional in name only, and actually impose early choices on the adolescent pupils, may be due to the administrative difficulty involved in the offering of a greater number and variety of activities to large numbers of pupils. With two exceptions, all of the administrators who have commented on this situation state frankly that they are desirous of overcoming this apparent undemocratic practice just as soon as a satisfactory arrangement can be devised to meet the administrative problem of providing for all of the pupils.

In the 303 most progressive schools reporting on their main objectives, the equipment, the materials, and

Table I. Pertinent Facts Showing the Relation Between the Size of the Community and the Nature of the Industrial Work Offered.

Population of Cities	Schools Reported Number	Schools Reported Per cent	Claiming Reorganization Number	Claiming Reorganization Per cent	Denying Reorganization Number	Denying Reorganization Per cent	Nature of Work
5,000 to 10,000	76	20	49	13	27	7	Bench woodwork, and bench woodwork and drawing in over 97 per cent of these schools.
10,000 to 25,000	185	49	177	47	8	2	3 to 6 activities such as carpentry, concrete, electrical, printing, machine shop, pattern making, foundry, drafting, etc., in 93 per cent of cases.
25,000 to 200,000 and over	118	31	116	30.5	2	.5	6 to 16 activities and related studies in over 96 per cent of these schools.
Total	379	100	342	90.5	37	9.5	Over 75 per cent diversified to some extent.

the technique in nearly all cases chosen from important industrial pursuits, but with few exceptions, the recognized pupose of the work and study in these courses as shown in Table II. is not primarily to produce skilled workers for definite vocations, as is true in the trade preparatory or trade continuation classes. The main objective is rather to help all pupils, regardless of their social status or possible lifework, to develop industrial intelligence and thinking power in connection with life situations. Therefore, each activity not only includes contact with typical materials, tools and machines, but is also organized with the intention of (1) giving a broader appreciation of economic production and demanding more respect for the various workers and their work; (2) of preparing for more intelligent judgment and use of industrial products and service; (3) helping develop insight and to promote more efficient production; (4) of offering opportunity for testing the interests and aptitudes of students both in positive and negative ways, in order that worthy needs and capacities may be developed through specific training. As shown by Table I, the size of the community too often determines the extent, nature, and effectiveness of the activities offered.

Table II. Main Reason Given for Offering Industrial Activities and Related Studies in Each of 303 Intermediate and Junior-High Schools.

Chief Emphasis and Claims	Schools Number	Schools Per cent
Contributing to the general experience, all-around development, and industrial intelligence	118	39
1. Understanding and appreciating economic production in some form;		
2. Gaining respectful attitudes toward the various workers and their work;		
3. Having ability to judge industrial products and do simple repair and construction work, etc.		
Aiding in the intelligent selection of industrial occupations without encouraging early choices	101	33
1. Trying-out individual inclinations, interests, and capacities for industrial pursuits through typical experiences;		
2. Making reliable studies of the conditions, demands, and opportunities in related occupations; etc.		
Enriching the school experience of the pupils through concrete situations	78	26
1. Having science, mathematics, and other subjects, profit from a better understanding of materials, processes, tools and machines;		
2. Providing for the individual needs of pupils who would not remain for academic education alone.		
3. Helping pupils more wisely to choose future courses in secondary and higher education, etc.		
Preparing for entrance into industrial vocations	6	2
1. Extending the try-out activity to meet the preparatory-vocational needs of pupils who find it necessary to leave school with a minimum of preparation;		
2. Offering greater opportunities for commercial experiences in shopwork by cooperating with outside productive plants during the ninth year, etc.		

That the actual shopwork in a considerable number of these large and smaller secondary schools includes a fairly wide range of experiences is shown in Figure I.

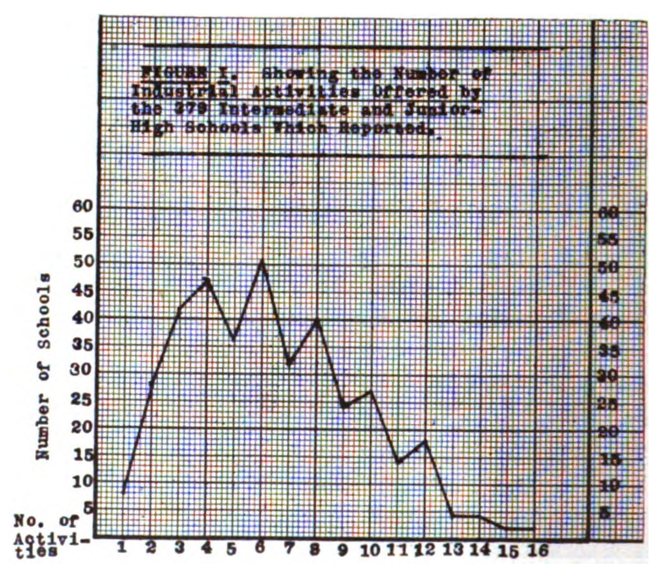


FIG. 1. INDUSTRIAL ACTIVITIES OFFERED IN 379 JUNIOR HIGH SCHOOLS.

These are selected in the main from present-day occupational pursuits, such as printing and publishing, carpentry, cabinet and furniture making, wood finishing, pattern making, foundry, forging, machine shop, sheet metal, concrete, photography, electrical, plumbing and pipefitting, automobile operation and repair, general construction and repair, drafting, and the like. Because of the advantage in having several kinds of materials, tools and machines available in one unit for immediate use, and also because of the extended opportunity for observing many distinct types of construction

work, a general workshop plan frequently has been developed in preference to a number of separate, specialized shops, especially in the smaller communities. In either case, all projects and problems taken up in connection with each one of these activities preferably result in serviceable and useful products. As the occasion requires it, each project gives some consideration to the kinds and qualities of materials, the appropriate design and construction, the processes of manufacture, the applied mechanics, physical sciences, and mathematics, and the industrial history and civics as these relate to the study at hand.

Dr. F. G. Bonser of Teachers College, Columbia University, has referred to these promising courses happily as those "following the elementary school period, well adapted to the interests of boys during the period of early adolescence when more intensive studies of industry will give a still greater opportunity for testing aptitudes, and develop greater intelligence and appreciation of industrial processes, problems, and relationships. The time for the beginning of this somewhat differentiated work for boys is probably at about the beginning of the seventh grade. The rapid development of the junior-high school or intermediate school bids fair to see such courses well organized for seventh, eighth, and ninth grades with from one-third to one-half of the time devoted to the study of industrial processes, shopwork, and closely related subjects for those who elect such courses, the remaining time applying to the usual general or academic subjects for these grades. By providing partial differentiation in these years, and at the same time keeping much work in common, the individual interests and aptitudes of children may be respected and developed, and yet the democratic character of the whole school maintained."[1]

Types of These Junior-High-School Industrial-Arts Activities.

The following types of eighth grade industrial-arts courses, which first were inaugurated three years ago as a part of the junior-high-school program at The Lincoln School, New York City,[2, 3] and incorporated the most successful and practicable features resulting from a careful study of over 300 progressive junior-high schools and intermediate schools in various parts of the country, are examples of the promising organized activities already described in some detail for either the large or small school system. A minimum requirement of three hours weekly during each of the seventh, eighth, and ninth years is found to be a reasonable amount of time for each of the essentially required industrial arts units offered.

[1]Bonser, F. G. "New Types of Industrial Work in Schools," Teachers College Record, May 1, 1915, Vol. XVI.

[2]These statements do not account for any changes which have taken place since October, 1920.

[3]*Note*—It might well be stated that the accepted policy of the whole junior-high school was then that "essentially required courses be given for the purpose of giving valuable contact with different types of world knowledge and with interesting and profitable activities; and that such courses serve as a basis for purposeful election of courses in the senior-high school; but that individual students be permitted to discontinue sequences of courses and substitute others, with the permission of their advisers."

Printing and Publishing.

(*Eighth Year.*)

Some freedom has been allowed all pupils in choosing projects to be printed. However each pupil is required to gain certain understanding and experience in composition, stone work, proof-reading and correcting, making-up forms, press work, distribution, and the other important processes typical of the job print shop. The thought-provoking problems, which are usually of a semi-commercial nature, are an outgrowth of the school or individual needs. These include such work as the printing of cards, programs, tickets, and straight matter at first; while later the artistic arrangement of headings, spaces, and lines is applied to the printing of announcements, forms, booklets, school publications, and the like.

This is followed by problems in color work and studies in modern illustrating. As the work progresses, the following types of information and skill are required sufficiently to give all pupils some appreciation of the methods and important conditions in our printing trades.

I. **Composition and Proof-reading:**
1. Type case.
2. Handling and setting type.
3. Tools and materials.
4. Setting and distributing straight matter.
5. Printing terms.
6. Setting and distributing display matter.
7. Reading and marking proofs.
8. Correcting type matter.
9. Setting from manuscript.
10. Expressing ideas in print in such a way as to attract attention to stimulate thought, and, if possible, to produce action.

II. **Stone work:**
1. Locking-up in the chase.

III. **Press work:**
1. Making ready on the job press.
2. Preparing paper and inks.
3. Feeding the press.
4. Study of presses.

IV. **Typography:**
1. Types and type-faces.
2. Proportions, harmony, tone, and contrast.
3. Planning and layout of work.

V. **Studies related to printing and publishing:**
1. History of printing as it relates to present-day practice.
2. Making books and magazines (Harper Brothers).
3. Making newspapers (New York Times).
4. Relation of the school shop to the larger productive offices.
5. Conditions, requirements, and possibilities in printing and allied trades.

Machine Shop.

(*Eighth Year.*)

The possible machine-shop problems have consisted of machining, casting and steel parts to be used in the construction of power machines and also the doing of smaller problems such as arbors, washers, bolts, nuts, gear blanks, screws, bearings, bushings, pulleys, lathe centers, tool shanks, box caps, clamps, pipe threading and fitting, and various repair jobs as these are selected from the needs at the school and about the home. This

wide range of work makes it possible for each pupil to have a reasonable amount of freedom in choosing projects and problems in the different divisions of the activity. Before the engine lathe or any other machine tool can be operated by the pupil without assistance, the importance of oiling the bearings, adjusting the machine parts for safety, fastening the work, choosing and setting the correct cutting tools, selecting the proper feeds and speeds, and taking the trial and finishing cuts must be thoroughly appreciated. During the eighth year the following types of information and skill are acquired as a basis for understanding the processes and gaining insight into the metal trades:

I. Lathe work:
- **1. Cylindrical turning on centers.**
  - **a. Location and drilling of centers, grinding and setting of tool.**
  - **b. Turning to definite size, using calipers, scale, and finer measuring instruments.**
  - **c. Typical lathe operations.**
- **2. Taper turning.**
  - **a. Calculating tapers.**
  - **b. Method of turning.**
  - **c. Finishing.**
- **3. Thread cutting.**
  - **a. Calculating change of gears, etc.**
  - **b. Grinding and setting treading tools.**
  - **c. Cutting right and left hand threads.**
- **4. Chucking and boring.**

II. Drill press:
- **1. Methods of holding work.**
- **2. Various uses.**

III. Bench and floor work:
- **1. Chipping, sawing and filing.**
- **2. Laying out, fitting and assembling.**
- **3. Soldering.**
- **4. Use of taps and dies.**
- **5. Tempering and grinding tools.**
- **6. Key seating and fitting.**
- **7. Babbeting and scraping boxes, etc.**

IV. Related information:
- **1. Studies in elementary mechanics, mathematics, and short cuts as applied to practical shop problems.**
- **2. Use, design, and construction of common and special hand and machine tools.**
- **3. Methods of manufacture and commercial uses of iron and steel.**
- **4. Relation of school experiences to organization and production in different machine shops.**
- **5. Conditions, requirements, and possibilities in metal and allied trades.**

Related Information as a Basis for Industrial Insight and Guidance.

It is now quite generally realized that *the most urgent need for the majority of boys from 12 to 15 years of age is not so much for a high degree of manipulative skill in trade operations as it is for reliable information with which to judge the industries.* Where the best results have been obtained, the exploratory shopwork plan has been paralleled by a study of real, productive industry rather than by a mere textbook acquaintance. There are but relatively few kinds of raw materials, and comparatively few principles involved in their manufacture. The number of great type industries and their important processes of production also are small to a surprising degree, which suggests that these studies should follow type activities and widely significant operations somewhat intensively. In addition to studies of general industrial conditions and relationships, group excursions to local plants and investigations of the various types of occupations as to importance, health conditions, needs, qualifications, wages, opportunities, conditions of employment, and the like are helping to form sound judgments relative to the character and possibilities of industrial callings. As the occasion requires it, pupils are brought in touch with reliable reading matter, unbiased specialists, or whatever sources of information are most needed at the time. In some schools a simple but effective "vocational index" is used advantageously to record the inferences of teachers and others based upon activities carried on inside and outside of school, both during the attendance and follow-up periods.

While these diversified activities and occupational studies undoubtedly are beginning the preparation of life work for a large number, it certainly should not be assumed that all pupils who are taking industrial arts will go into the industries. If properly organized, a scheme of industrial-arts education should be liberal enough to help those who can continue their school work to choose wisely their more specific courses in secondary and higher education, and likewise help those who find it necessary to leave school with a minimum amount of education to choose their respective occupations most intelligently. Therefore, it is proving desirable to have the work and study include a large number of industries and industrial processes, in order that all may have a rich and varied experience upon which to draw, in any event.

Whenever vocational classes or cooperative courses exist, it often has proven more satisfactory to carry on as little as possible of the additional productive or highly specialized work in the "try-out" or "opportunity" shops of the intermediate school or the junior high school. At any rate, it is reported that a reasonable number of industrial plants are being visited, first-hand information of the proper type is being made available, and an attempt to make the existing relationship between the school activity and the industry represented clear is undertaken seriously in a comparatively large number of these schools.

Possibilities in Courses for Educational and Vocational Guidance.

Much of the criticism of the vocational guidance movement in this country may be attributed to the objection to having early decisions forced upon young persons by the larger experience of teachers and counsellors. When reduced to its lowest terms, this conception of guidance merely concerns itself with placement, which consists of finding jobs or employment for pupils. Although teachers are certain to realize the need for giving counsel and information during the junior high school period, and the very nature of their positions will cause them consciously or unconsciously to give much of both, nevertheless, the experienced teachers

fully realize their limitations in this uncertain field where many pitfalls are possible as a result of misdirection. On the other hand, *the great need for dealing intelligently with the problem of an efficient choice, both as to self-expression and public service, suggests that the decision might well come as a result of the pupil's understanding of economic facts and values.* Even though the school fails to keep its pupils from choosing blindly by presenting the related information and helping them to interpret this in terms of the existing conditions, the fact remains that sooner or later most secondary school pupils will choose their life work.

Several suggestive experiments have been developed to ascertain the benefits which may be derived from organizing separate courses in vocational and educational guidance as a definite part of the junior high school program. One of these courses, which offers some promise, was introduced at The Lincoln School of Teachers College, New York, as an experiment in September, 1919. At that time, it was decided to devote one period of each week to provide all ninth grade pupils with reliable information concerning the social, economic, and larger personal aspects of the most important life occupations. This course was planned to help all pupils who continue their school work to choose their courses more wisely in the senior high school, as well as in their higher education, and also to help those who might find it necessary to leave school with a minimum amount of education to choose their respective procedure more thoughtfully.

In connection with each possible life occupation studied, detailed considerations relative to the nature of the work, the advantages and disadvantages, the qualifications and training, the possibilities, remuneration, and advancement were had through reliable reading matter, class discussions, student reports, talks by specialists, and excursions. This organized information merely supplemented that which had been given in the other school activities by presenting all of the related facts that may help pupils to weigh values and choose their future courses and work. Aside from these vocational guidance values, this course also includes a brief interpretation of economic life, industrial ownership, labor problems, related organizations, scientific management, supply and demand, and the development of our present-day producing and service groups, in order to give understanding and to encourage a wholesome attitude toward work and workers in each occupation studied. Such important life callings as agriculture, fishing, mining, food manufacturing, textiles and clothing trades, mechanical pursuits, printing and publishing, professions and allied occupations, engineering professions, and commercial occupations were studied during the year with apparent interest and profit.

Problems in the Organization and offering of Industrial Activities.

The junior high schools in the large school systems usually have organized their industrial courses on the rotation plan by having separate, specialized shops to provide proper facilities and instruction for the various classes, each pupil of which elects from two to four different activities a year. In the latter case, each one of these unit courses is offered from five to seven and one-half hours a week during a period of either nine or ten weeks. On the other hand, the time allowed for the industrial-arts in many of our upper grade curricula is still entirely too small for the manual aspects of the work and the studies of conditions and processes in the workaday world. Many of the small junior high schools and intermediate schools also are hampered temporarily because of the necessary expense for suitable equipment and instruction. Nevertheless, many teachers in the smaller communities have had the courage to reorganize their courses on the general workshop plan already mentioned, thus adopting the all-around shop which is expanded easily from time to time.[4] This procedure makes it possible to include other typical industrial activities besides woodwork, which unquestionably offers somewhat limited possibilities for getting concrete experiences and studying present-day industries. In some of these schools, where only six different units of industrial-arts are provided, the length of time devoted to each unit course is extended to a semester, if the activity and related study in question can be justified for this time, and the length of the periods or the number of periods a week is reduced to meet the local situation.

In making this investigation it was found that the general aim of the industrial courses for seventh, eighth, and ninth year boys do not differ greatly as a result of the size and location of the school. On the other hand, the organization of each respective department has been determined necessarily by the size of both the community and the school, as a number of instructors and several distinct shops are used to accommodate large numbers of pupils while only one man or perhaps two men will be available to teach industrial-arts in the smaller school. The general try-out courses taught at the Washington and Jefferson junior high schools at Rochester, New York, are examples of the former type, having a separate shop and instructor for nearly every particular form of industrial activity offered. This type of organization allows the boys to have samplings of about ten weeks from each of four different shops during each year. Printing, cabinet-making, gas engine, sheet metal, pattern making, and machine work are each offered for ten weeks, however, this does not mean the same total number of hours in each shop. Printing and cabinet-making are offered during the last half of the seventh year, when only six hours a week are allowed for shopwork, while twelve hours a week are given in the eighth year to gas engine, sheet metal, pattern making, and machine work respectively. During the ninth year twelve hours a week are provided for shop work and, since this is the last year of the try-out

[4]Bowman, C. A. "Industrial Education for the Smaller Community," Manual Training Magazine, Jan., 1917, Vol. XVIII.

period, each boy is allowed to choose one or more activities from cabinet-making, finishing, printing, machine shop, pattern making, sheet metal, gas engine, painting and decorating, plumbing, electricity, and baking. Related industrial mathematics, elementary science, and drawing and design are required throughout the two and one-half years of the course; seven and one-half hours a week being allowed for mathematics and drawing, while one-fourth as much time is spent on elementary science as on shopwork.

It is important to note that the various kinds of industrial activities offered in the Rochester junior high schools are typical of important industries represented in Rochester, New York. In addition to this try-out course plan, each school also offers separate industrial, technical and vocational courses. Perhaps it should be mentioned that the Rochester Trade School, which is likewise a part of the city school system, is prepared to give even more definite vocational education to those desirous of preparing for specific industrial pursuits or trades. This school has trade agreements with many of the leading shops and factories in that city.

Modifications of this plan for the rotation of shop work are being practiced more or less effectively in Duluth, Minnesota, in New York City, in Grand Rapids, Michigan, and in many other cities. The shop work at the Ben Blewett junior high school in St. Louis, Missouri, is organized into two divisions: First, the seventh grade, which has compulsory activities; and, second, the eighth and ninth grades, which have elective shop courses. In other words, each pupil has an opportunity to choose between the technical arts, science, commercial art, and classical courses after completing the essentially required industrial-arts work during his seventh year. More detailed statements of these courses, as well as reports on several units, projects, and problems which have been successfully developed by individuals having somewhat varied points of view and results, will appear later in separate articles.

Improved Methods Needed in Many Industrial-Arts Activities.[5]

In spite of the excellent results and promising outlook which have been reviewed, this investigation makes it evident that tradition practice still too largely determines the content and method of the industrial subjects in the seventh, eighth, and ninth grades. The following facts, which are based on this survey relating to the instruction received by 7,389 pupils in different sections of the country, show that large numbers of these courses include features which are extremely wasteful and consequently omit much that is useful. While a few of these school systems have introduced the junior high school plan of organization in name only, as previously suggested, it is reasonable to believe that the methods and procedure for the industrial courses in these 379 selected schools are, at least, equal to the instruction ordinarily received in other schools having similar aims and purposes.

[5]Edgerton, A. H. "Experimental Work in Junior-High School Industrial-Arts." Industrial-Arts Magazine, July, 1919, Vol. VIII. (See also for Tentative Course of Study.)

I. *Over 20 per cent of these schools report that the shopwork in their courses is confined to work in wood only.* (See Table I.)

Even though this work properly represents the divisions of the woodworking industry (carpentry, pattern-making, and the like), and is supplemented by studies of occupations through shop excursions and readings, it at best offers limited opportunity for gaining typical experiences and studying our present industrial pursuits and needs. It is doubtful if those courses which mainly tend to emphasize manipulative skill in the use of woodworking tools can be expected to do more than to gain meager responses in interests, inclinations, and capacities, for reasons which will follow.

II. *Over 78 per cent of these schools report that their courses emphasize the doing of many operations or processes without respect for the needs and interests of their pupils.*

Several of these courses allow the pupils to make worth while products, thus allowing the manipulative skill to be incidental to the solution of the construction problems, but completely fail to allow an opportunity for thinking out and making plans to meet the difficulties involved in their work. The majority of these pupils are required to do their work in a certain prescribed way, as the chief emphasis is placed upon the following of directions, and very little allowance is made for initiative. A number of the instructors of these classes report that they are encouraged to do much of the pupils' work for them, since the success of their courses is frequently judged in terms of the quantity and quality of work which is displayed at the annual school exhibition. The least successful of these courses, however, are those which require all pupils to make formal exercises, models, or pieces that give considerable skill in the use of tools but offer little else of value. Nearly 60 per cent of the instructors admit that the repair and construction work which they are required to do for the school systems forces them to emphasize the production work needed rather than the specific needs and interests of the learners.

Perhaps there is greater danger of exploiting pupils in industrial courses than in any of the other school subjects. This is explained by the insistence of some administrators and teachers upon having all maintenance work, such as repairing and making furniture and other school equipment, printing school forms, and the like, done during the regular shop periods, regardless of whether or not the pupils concerned are benefitted by the particular kind and amount of experience involved in the work which they are required to do. Where the doing of the work is given this undue amount of emphasis, one cannot help wondering if those responsible for this procedure are not more concerned with the repair and construction work than with the educational growth of their pupils. At any rate, some such method as the following must be developed for overcoming this ex-

tremely bad feature of tending to make the school shops a sort of "dumping ground" by selecting experiences which obviously have meager educational value during regular school hours.

An *employment bureau plan,* which was introduced three years ago at The Lincoln School, New York City, affords several unique educational advantages by assisting the older pupils in finding interesting and instructive employment about the school during out-of-class hours. Pupils from all classes of homes are given an opportunity to do certain parts of the school's work, such as printing school forms and announcements checking and receiving pay in the lunchroom, assisting in the library or classroom, and repairing and constructing school equipment. This work in question, is arranged and recorded by the pupil in duplicate form on the job card shown in Figure II, after which it is carried out under the supervision of the teacher in charge of the respective activity. The amount of money which pupils are paid for the different kinds of unskilled, semi-skilled, and more highly skilled or responsible work ranges from ten cents to tewenty-two cents an hour; however, the rate allowed in each case is determined by the nature of the work at hand and the ability of the pupil chosen to do it. Although the pupils are free to give only a few hours a week to this special activity, all of the junior high school pupils participate in at least one or more of these profitable experiences during the year.

In addition to the financial consideration, this employment bureau plan gives pupils a better appreciation of actual service, and offers valuable experience in learning to earn without danger of exploitation. The various tasks not only furnish an excellent substitute for the responsible duties which children have in the rural communities, but also make it possible for boys and girls to use their special interests and abilities beyond the stages when the work can be justified as a legitimate part of the regular class activities. This type of employment organization represents a relatively small investment and is not considered a financial burden in any sense. It provides a satisfactory means for disposing of certain necessary jobs which offer somewhat limited educational value during regular school hours, and it likewise allows the industrial-arts courses to emphasize the needs of the learner in preference to the needed repair and production work which should have a place.

Regardless of the size of the school system, of the industrial-arts activities are to continue to occupy an important place in the program for general education, these courses must be expected to share the responsibility with the other subjects for helping adolescent boys to develop perspective and thinking power in connection with real life situations. Recent investigations clearly show that such larger values as industrial intelligence and insight can not be realized alone from the mere doing and making of things, where skill in the manipulation of materials, tools and machines is the main emphasis. Furthermore, *the psychological and sociological needs and interests of boys from 12 to 15 years of age are mainly in thought-provoking situations, projects, or problems, involving semi-productive or real production work,* rather than in series of exercises, models, pieces, or whatever else you may care to call them. Because of the natural interest which boys of this age have in industrial or mechanical things, they can be required to make series of formal pieces, models, or exercises without much resistance; however, to thus take a considerable amount of time in *over-emphasizing skill in the use of a few tools and materials* means a great sacrifice in the larger values of the work, as already stated. The results of much observation and several experiments make it obvious that any values which exist in such formal courses may be retained and given greater emphasis where the boys' chief concern is the construction and solution of useful projects. The most valuable of these challenge boys to think out, study, and make definite plans to meet the difficulties involved in the related problems, as well as to select proper materials, tools, and operations; to make calculations on stock, operations and cost when needed; and to carry out the other requirements which the specifications demand.

The preceding article is the first of a series of four papers on the Industrial Arts in Junior High Schools. The second will take up "Methods of Offering Industrial-Arts Courses and Projects."—Ed.

The First Glassware Made in America

Temple Collection Includes Products of Pennsylvania and New Jersey Factories More Than One Hundred and Sixty Years Old

By W. Calver Moore

A COLLECTION of antique glassware whose beauty of finish, variety and perfection of design, and skillful craftmanship would delight the heart of the antiquary has been on display at an art gallery in Philadelphia recently.

These relics of one of the first industries of this country are included in the Temple Collection of Early American Glass, comprising more than two thousand separate pieces with a total value that runs well up into six figures.

Peculiar historical interest attaches to this collection inasmuch as the first commercial enterprise started in America was a glass factory established at Jamestown, Virginia, between 1621 and 1625, where four Italian workmen engaged in the manufacture of glassware, their principal product being glass beads for trade with the Indians. Some specimens of these beads from the Jamestown factory were found in Indian graves along the Susquehanna River in Lancaster County, Pennsylvania, and are included in the Temple Collection.

The major portion of the exhibit, however, is devoted to table glass ware, although there are also a number of flasks, flagons, and odd shaped whiskey bottles, some of them molded in the design of a log cabin with the neck of the bottle forming the chimney. These are priceless.

Practically every form in which glass could be blown for table use is represented. There are blue sugar bowls, high salt cellars, carafes, sillibubs, double cruets, "cotton thread" wine glasses, cream pitchers, flips, decanters, an amber mug so rare that only one other specimen is known to exist, vases, plates, candy jars, water pitchers, plain tumblers, gobblets, and so on in almost endless variety.

As all these pieces were made by the old blowing process, some of them show an occasional irregularity in contour or a slight misadjustment of the handle, that merely seems to give them additional charm in the eyes of the connoisseur. There are others that plainly reflect the individuality of the workman producing something without any need to adhere to a standard of size or proportion, and they are unusually interesting from this angle.

Some specimens are beautiful beyond the power of words to describe and only the most expensive color plates could serve to convey an idea of the warm shade of the rare amber mug, the clear deep green or blue of a cream pitcher, or the dark brown shown in some of the bottles, flasks and vases. Amethyst flasks are included in the collection that are valued at close to a thousand dollars each. They are about seven inches high, with fluted sides and narrow necks, and are so fragile that no surprise need be felt over their scarcity after the lapse of more than a century and a half.

Beginning of the American Glass Industry.

In 1639 glass was being made at Salem, Massachusetts, and in 1683 at Philadelphia, Pennsylvania, but no authentic specimens of these small industries have been preserved.

In 1732 two factories were operated in New York City, one in Connecticut in 1747, one in Brooklyn, New York in 1754, and one in Germantown, Massachusetts (now the city of Quincy) in 1760. All of these, however, were small affairs, for local trade, and of short duration.

The first factory of importance was started at Allowaystown, Salem County, New Jersey, in 1738. It was established by Casper Wister who imported four

FIG. 1. CASE OF STIEGEL GLASS THAT CONTAINS MANY SPECIMENS WORTHY OF CAREFUL STUDY. VERY DIFFICULT TO PHOTOGRAPH OWING TO THE MANY COLORS AND REFLECTIONS.

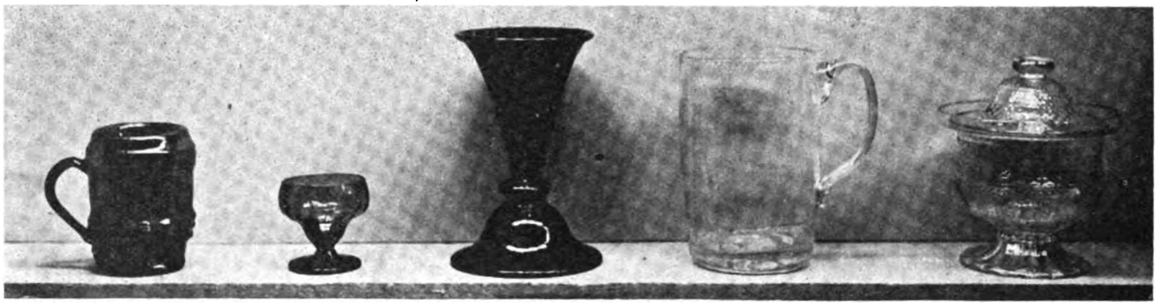


FIG. 2. A RARE AMBER MUG, HIGH SALT CELLAR, BLUE VASE, TANKARD AND SUGAR BOWL MADE BY STIEGEL.

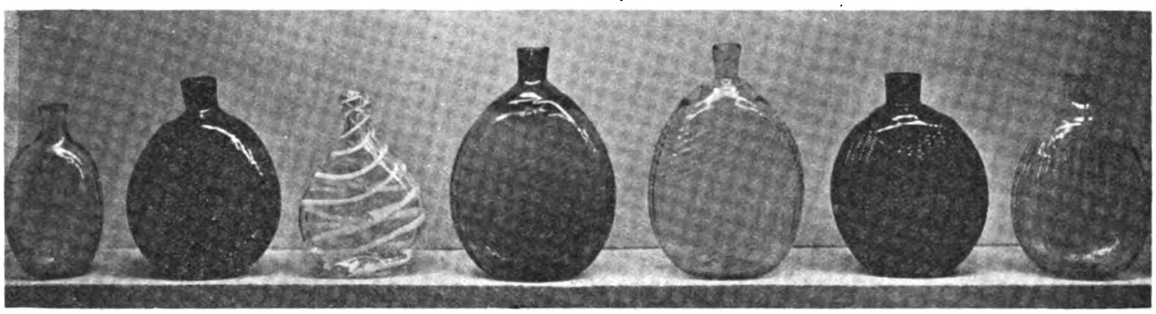


FIG. 3. STIEGEL POCKET FLASKS. THE ONE WITH WHITE STRAPS IS A DOUBLE BOTTLE THAT WOULD CARRY TWO KINDS OF LIQUID, VERY RARE. THE SECOND ONES FROM EACH END ARE THE RARE AMETHYST FLASKS.

FIG. 4. GLASS MADE AT THE PITKIN PLANT AT EAST HARTFORD, CONNECTICUT, ESTABLISHED IN 1783. NOTE THE QUAINT CRUETS AND THE GRACEFUL DESIGN OF THE WATER PITCHER.

FIG. 5. VASES, PITCHERS AND DECANTER MADE AT WISTERBURG, N. J. THE HOLLOW SPHERE SERVED AS A LID FOR THE PITCHER AND ALSO ENHANCED ITS VALUE AS A "SIDEBOARD ORNAMENT." THE STOPPER OF THE DECANTER IS SURMOUNTED BY THE FIGURE OF A ROOSTER.

skilled workmen from Rotterdam for the manufacture of bottles and window glass. There is nothing on record to prove that this factory made table glass, but collectors and curators have always considered that some of the beautiful old specimens found in this locality are Wister products. Several specimens of table glass in the possession of Wister descendants go far to substantiate this belief. The same inference may be drawn from advertisements in the "Pennsylvania Chronicle" of July 31, 1769, and the "Staatsbote" of September 30, 1765, which were inserted by Richard Wister, son of the founder, who kept the plant working until the financial depression of 1780. Eighty pieces of this "Wisterburg" glass are catalogued in the Temple Collection.

The most famous establishment, however, was that of a native of Mannheim, Germany, Baron Henry

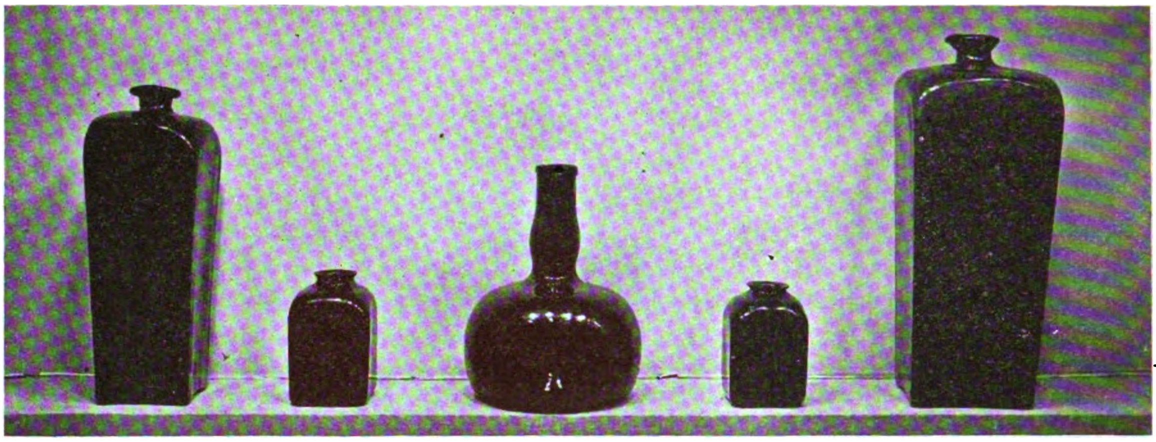


FIG. 6. HOW SUGGESTIVE ARE THE OUTLINES OF THESE ANCIENT BOTTLES! MADE AT THE WISTER PLANT.

William Stiegel, who came to Philadelphia in 1750. After engaging in the iron founding business for several years he purchased a furnace from his father-in-law, Jacob Huber, situated in Lancaster County Pennsylvania, and called it Elizabeth Furnace. This venture proved successful, however, in 1760 Stiegel began to experiment in making flint glass, and in 1763 started to market his wares in nearby Pennsylvania towns, such as Lancaster, York, Hanover, Harrisburg, and Carlisle. Stiegel's glass soon became famous throughout the Colonies and his business grew until in 1765 he established what was perhaps our first industrial town of the kind by laying out and constructing a portion of the present town of Manheim, about twelve miles north of Lancaster, Pennsylvania, named after his birthplace.

Introduction of Stiegel's glass in the great population centers of Philadelphia, New York, and Boston, combined with an embargo by the trade on imported goods to encourage American products, resulted in rapid expansion. Stiegel bought large tracts of land and increased the size of his factory, employing more than one hundred men in his glass house, until in 1774, at the height of his career, the glass business suffered a setback on account of the impending Revolution. Stiegel became a victim of over-expansion. He had borrowed heavily to finance his large business and could not weather the period of depression, finally becoming bankrupt and being imprisoned for debt. After his release he spent the remainder of his life teaching school. Thus ended the career of one of our early captains of industry, some of whose product is still preserved and treasured for its artistic excellence and historic interest.

Stiegel's workmen were imported from Germany, England, and and other parts of Europe and accordingly much of his glass resembles the foreign product of the same period.

There are a number of specimens of Millefiori glass in the Temple Collection. This derived its name from a cluster of flowers and is made by fusing together small glass rods of different designs and colors. These specimens were made in New Jersey at Glassboro, Millville, Milford, and Waterford, and take the form of paperweights, inkwells, canes, chains and lillies.

About the middle of the eighteenth century the making of Millefiori glass became a considerable industry in Bohemia, Alsace-Lorraine, and Bacaret, France. Many of the workmen who had learned the secret of making it made their way to England and America. Between 1850 and 1870 a large trade in these novelties was carried on until almost every house throughout New England and New Jersey had one or more of these objects for the writing desk or corner whatnot.

Also on exhibition are a few pieces from the East Hartford Glass Company, operated by William Pitkin from 1783 until 1830. Other items in the collection are bottles from Coventry, Connecticut (1813 to 1848); bottles from the Kensington Glass Works in Philadel-

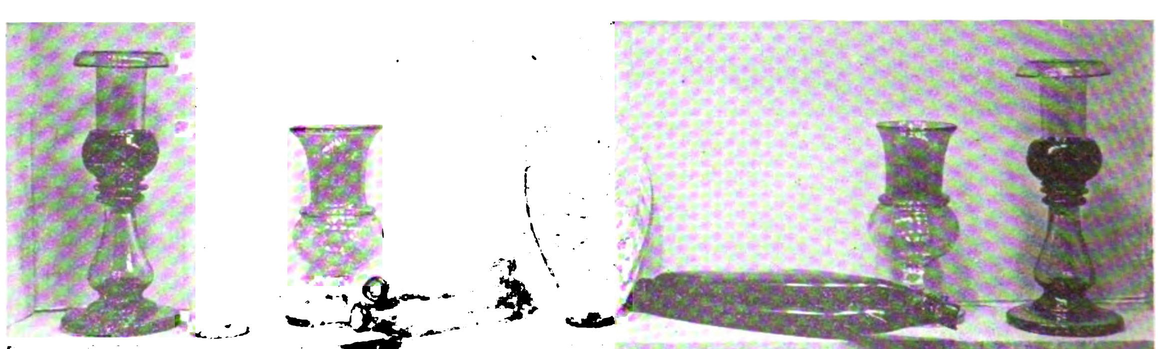


FIG. 7. CANDLESTICKS AND VASES FROM MILLVILLE, N. J., AND BOTTLES MADE AT WISTERBURG, N. J. NOTE THE "DOUBLE BARRELED" POCKET FLASKS—ONE OF THEM SUFFICIENT TO PROVIDE REFRESHMENT FOR A LONG TRIP BY STAGE COACH.

FIG. 8. STIEGEL ENAMELED BOTTLES. WINE FLIPS, TUMBLERS, AND MUGS OF GENEROUS CAPACITY WERE ALSO MADE IN SIMILAR DESIGNS.

phia (1771 to 1921); silvered glass from the New England Glass Company (1817 to 1831); and the Boston and Sandwich Glass Company (1825 to 1890). The last named factory is given credit for inventing and making the first pressed glass. Their product included pressed glass table ware, such as cup plates, lamps, candle sticks, sugar bowls, pitchers and similar articles, in all colors.

Other specimens in the collection whose age is a hundred years or more, represent the product of the Baltimore Glass Company established in 1790, Messrs. Blakewell and Company, Pittsburgh, 1824, and the Pittsburgh Cut Glass Company, 1809.

Pittsburgh is now the leading glass center of North America, although the glass factory started by Stenger Bros. at Glassboro, New Jersey, in 1775 and still in operation is the longest established glass factory in this country.

This plant, which is "one year older than the United States" now has single machines which can make as high as fifty thousand bottles per day without assistance from human hands, a remarkable development from the days of the old blow pipe, which was imported by the Egyptians from Asia Minor at the time of the Roman conquest and was the only glass making apparatus used by all countries until about 1840, when modern machinery with the advantage of more rapid and economical production began to displace it.

Part of this collection of early American glass was on exhibition for a time at the Pennsylvania Museum in Memorial Hall, Fairmount Park, Philadelphia, and it is probable that the entire collection will some day find a permanent resting place in one of our large museums, where the student of design, the antiquarian, and the artist will find inspiration in the quaintly beautiful craftsmanship.

The collection cannot be duplicated. Many of the specimens are the only known ones of their type and could not be replaced if broken. Their gathering was a labor of love and required 25 years of persistent search during which their present owner scoured the country in an automobile or carriage and attended many sales of farm household effects. He also had his representatives who assisted in the collection of this glass, as well as antiques of other kinds, and dragged forth many a precious piece from its hiding place in cupboard or garret.

It is to be hoped that the entire collection may be placed permanently on view in some public place where the student of art in industry may be able to examine it to his heart's content. Study of many of these pieces would be of incalculable value to the designer of pottery, or furnish just the right motif for the artist intent upon giving atmosphere to a picture of the period represented.

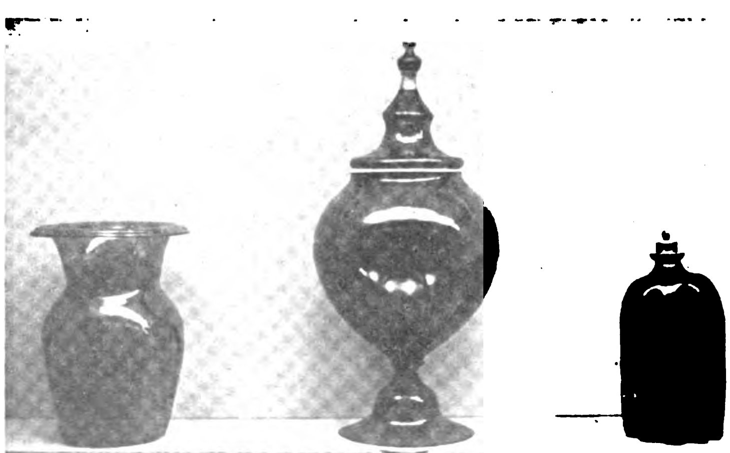


FIG. 9. A STIEGEL VASE IN BLUE GLASS, AND A BROWN URN AND BOTTLE THAT ARE PARTICULARLY INTERESTING.

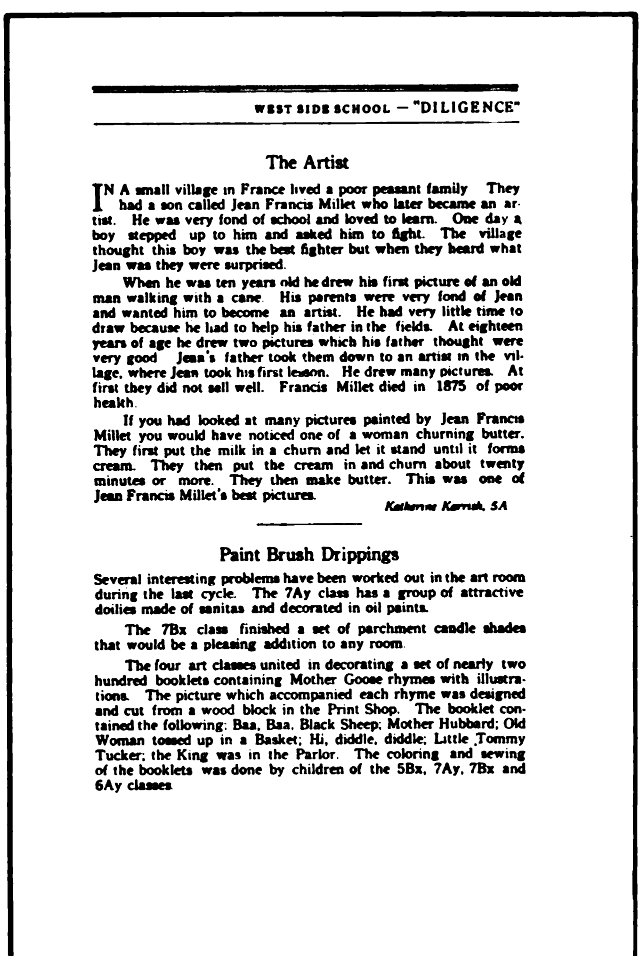
Publishing an Elementary School Paper

David Daniels, West Side School, Newark, N. J.

FROM practical experience in an elementary school print shop, I am of the opinion that publishing a school paper is about the most attractive, fascinating, and appealing project a school print shop can offer to energetic boys and girls. It is acceptable to educators because it is a problem in which the entire school takes part, also because it is a medium through which the academic department coordinates with the special activities. Through it, the school is afforded an opportunity to communicate with the parents, keeping them informed of the progress the school is making; and last, it creates an increased interest in nearly all school activities.

Does It Appeal to Energetic Boys and Girls?

What child will not rejoice when he reads his contribution or composition in print, especially if his composition was selected as the best from class work? What child will not feel honored and display profound joy when informed that through the recommendation of his teacher he has been appointed editor, business manager, or reporter for the present issue? He assumes a responsibility and is impressed with the feeling that upon him lies the success of that issue.


WEST SIDE SCHOOL — "DILIGENCE"

The Artist

IN A small village in France lived a poor peasant family They had a son called Jean Francis Millet who later became an artist. He was very fond of school and loved to learn. One day a boy stepped up to him and asked him to fight. The village thought this boy was the best fighter but when they heard what Jean was they were surprised.

When he was ten years old he drew his first picture of an old man walking with a cane His parents were very fond of Jean and wanted him to become an artist. He had very little time to draw because he had to help his father in the fields. At eighteen years of age he drew two pictures which his father thought were very good Jean's father took them down to an artist in the village, where Jean took his first lesson. He drew many pictures. At first they did not sell well. Francis Millet died in 1875 of poor health.

If you had looked at many pictures painted by Jean Francis Millet you would have noticed one of a woman churning butter. They first put the milk in a churn and let it stand until it forms cream. They then put the cream in and churn about twenty minutes or more. They then make butter. This was one of Jean Francis Millet's best pictures.

Katherine Karnish, 5A

Paint Brush Drippings

Several interesting problems have been worked out in the art room during the last cycle. The 7Ay class has a group of attractive doilies made of sanitas and decorated in oil paints.

The 7Bx class finished a set of parchment candle shades that would be a pleasing addition to any room.

The four art classes united in decorating a set of nearly two hundred booklets containing Mother Goose rhymes with illustrations. The picture which accompanied each rhyme was designed and cut from a wood block in the Print Shop. The booklet contained the following: Baa, Baa, Black Sheep; Mother Hubbard; Old Woman tossed up in a Basket; Hi, diddle, diddle; Little Tommy Tucker; the King was in the Parlor. The coloring and sewing of the booklets was done by children of the 5Bx, 7Ay, 7Bx and 6Ay classes.

TYPE PAGE OF PAPER PRODUCED BY THE AUTHOR'S STUDENTS.

BLOCK PRINTED COVER PAGE OF DILIGENCE.

The school paper enables teachers to introduce in their work some real, live practice. An account of the baseball game, comments on a talk given in the assembly, how to make bread pudding, the progressive steps in making a dress, happenings in the manual training shop, are subjects which require the pupil to write from observation, and to bring out an expression of his thoughts.

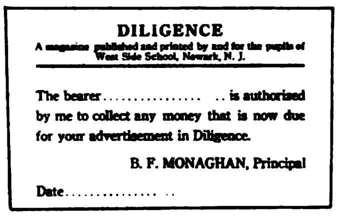
Let it not be understood, that although most of the writing, typesetting, proofreading, and printing will be done by the students, very close supervision by the teachers is not essential. Teachers should suggest to the pupils what kind of copy is suitable for the publication. It may be necessary to stimulate interest at certain times when it is found to be lagging, if publication is to be maintained at regular periods. Last, but not least, teachers should insist that the pupils use correct English and write intelligently.

The School Paper Can Be Made Self-Sustaining.

The expenses incurred in publishing a school paper are: paper; photo-engravings; if lineoleum-block engravings are made, materials used to make them; stitching, if no stitching machine is included in the outfit; and

incidentials needed while the work is in progress. The proceeds of the sale of papers will partly cover this expense, but advertisements solicited by pupils is a means which can be depended upon.

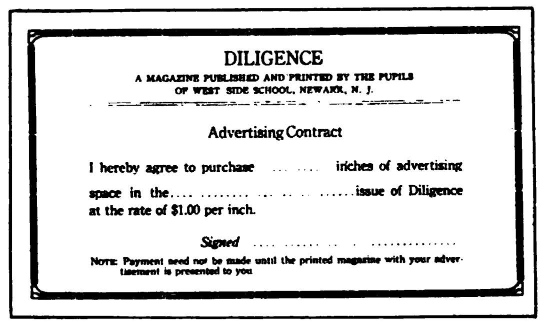
Here is a splendid opportunity for students to get some real training in salesmanship. Advertisements should not be solicited with the idea that it is a help to the school. The student should be trained to present some good reasons why it will benefit the merchant if


DILIGENCE
A magazine published and printed by and for the pupils of West Side School, Newark, N. J.

The bearer… …is authorised by me to collect any money that is now due for your advertisement in Diligence.

B. F. MONAGHAN, Principal

Date…

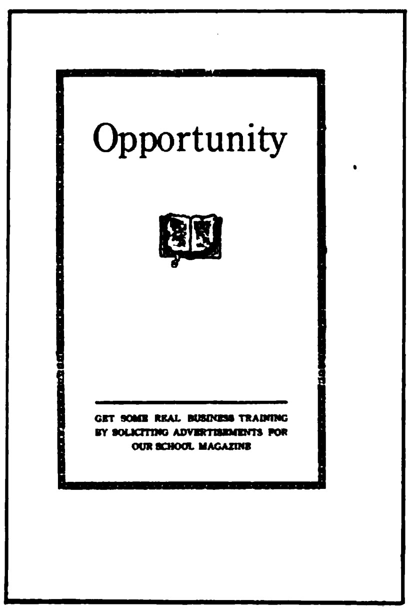

DILIGENCE
A MAGAZINE PUBLISHED AND PRINTED BY THE PUPILS OF WEST SIDE SCHOOL, NEWARK, N. J.

Advertising Contract

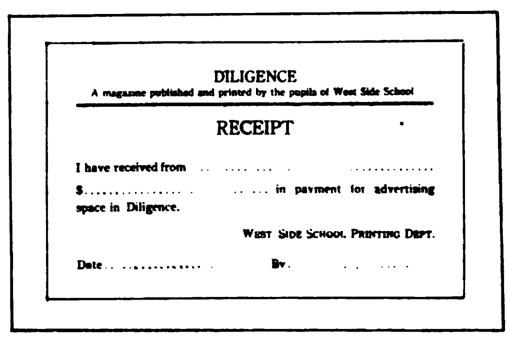
I hereby agree to purchase … inches of advertising space in the… …issue of Diligence at the rate of $1.00 per inch.

Signed …

NOTE: Payment need not be made until the printed magazine with your advertisement is presented to you


Opportunity

GET SOME REAL BUSINESS TRAINING BY SOLICITING ADVERTISEMENTS FOR OUR SCHOOL MAGAZINE


DILIGENCE
A magazine published and printed by the pupils of West Side School

RECEIPT

I have received from … …
$… … in payment for advertising space in Diligence.

WEST SIDE SCHOOL PRINTING DEPT.

Date… By…

TYPICAL "JOBS" PRINTED TO ASSIST IN HANDLING THE BUSINESS SIDE OF THE SCHOOL PAPER "DILIGENCE."

he advertises in the school paper, giving comparisons with other advertising media. Our school has been successful with this plan.

To insure the success of the publication and to publish an issue at regular intervals, a staff should be organized. This organization will not only insure its success but will tend to equalize the work, and not place the burden upon a few individuals.

The first step, then, is to organize the staff—student and faculty—the latter acting in supervisory capacity. The English teacher, a member of the staff, should be requested to supervise the work of the editor and reporters. All copy is to be sent to that teacher where it will be corrected and prepared for the print shop.

The art department, under the supervision of the art instructor should prepare for each number a cover design to be printed from linoleum blocks. This will help brighten up the school paper a bit.

The printing instructor should attend to the mechanical work, instruct the business manager and his assistants, and attend to the details.

From the student body, there should be an editor and his assistant selected from the eighth grade, and reporters selected from each grammar grade. Their duties should be as follows:

Editor and Assistant Editor—
- Editorials to the students
- Special news articles
  - Entertainments given by the school
  - Visitors
  - Alumni Notes
- Give reporters assistance, when needed
- Read proofs
  - Athletic News

Class Reporters—
- Class Notes
- News of shops, sewing, and cooking
- Gather humorous matter
- Assist in the sale of school papers

Note: A box should be provided for contributions from reporters.

Suggested Copy—
- Compositions by pupils
- Special articles by principal or teachers
- Classroom Notes
- Printing an Honor Roll
- Athletic News
- Jokes pertaining to school life
- Alumni News
- School News

Copy should come in regularly disregarding date of publishing.

Business Manager and Assistants—

Solicit Advertisements and collect money for same

Take charge of the sale of the magazine and account to the treasurer for all money received.

Display posters prepared in the art department a few days before the school papers are put on sale.

Probable Advertisers—

Milk Dealers, Butchers, Grocers, Florists, Tailors, Photographers, Motion Picture Theatres, Music Teachers, Confectioners, Opticians, Banks and Bakeries

JOB CARD

Date ____________

Nature of work ____________

To be made for ____________

Date promised ________ Extension ________

Date delivered ____________

Pupil's name ____________

FORM USED FOR "JOBS" IN THE AUTHOR'S SHOP.

Seasonal Work in Manual Training

Earl W. Thrall, Beloit, Wis.

SEASONAL work in manual training as I shall refer to it in this article means "taking care of the special work which the individual brings into the classes, as a result of the changing seasons of the year". I do not refer to this work as a definite assignment, to be planned a year in advance and to be worked on a certain day and in a certain way. Rather, I prefer to think of it, and use it as a stimulant to all classwork whether in the shop or drawing room.

Believing that no class nor no classwork, without interest, is, or ever can be successful I am sure we should always grasp any opportunity at any time, which furnishes its own interest.

The special job furnishees its own interest. In fact, interest is the creator of that job. The boy is thinking about this article and is interested in it long before he decides to satisfy this interest and desire by creating and building it and owning it himself. This is not copy work. Here is one of the few places where original ideas come to light except as they are forced by artificial stimulation of some kind. This model to a great extent represents the original ideas of the indivdual and to obtain this any boy will study well his construction and design. He will work hard on his drawings in order to convince you that he knows what he is doing, and he will work overtime to get this job done. Can we, as instructors, say as much for the work which we force upon boys as they follow our course of study? Any instructor who kills this existing interest and desire has lost a golden opportunity with the boy, and he will now be obliged to study this boy well and work long and carefully in order to overcome the handicap which he has forced upon himself.

A course of study is always a necessity, but it must be flexible at any and all points. It cannot be a hard-and-fixed course. The training of the mind through the hand does not depend upon following a rigid fixed order like a course in geometry * * * In our work, many roads lead to the same goal.

The success of any class or of any course of study depends entirely upon the interest which may already exist, or may be created, developed and stimulated by the instructor through his methods and system. If this interest does not exist among the pupils of your classes; if you cannot create it nor develop it; then you are not accomplishing your aim. Stop, now, and consider your methods. Keep the aim of your course always in view, but seek some means of creating interest in this movement.

Interest cannot be forced upon a pupil, neither can real interest be created in an instant. It must be developed as a natural consequence of events which have preceded it. In making definite and arbitrary assignments, great skill is needed by the teacher. Good judgment and a study of individuals as well as models, is necessary. Where definite assignments are made by the instructor, interest should be stimulated before work on the model is begun.

A boy's mind and fancies are "subject to change without notice". They change with the seasons, they change with the business of the local community, they change with the trend of the times. Last year he was interested in electricity solely on account of the wireless telegraph. Today, he has transferred his affections to the wireless telephone. It is still the same field, but the magnet of interest has moved to a different part or division of that field.

We can never make, nor find, a course of study which can be followed without continual changes to keep it alive and up-to-date, but there are conditions existing in nature and in the boy, which never change. Are not these then, things worth considering? Here are fixed conditions which we know will always exist, and the cycle of events is always repeated in the same order and at the same time of year. Nature has bestowed upon us the four seasons of the year, with their varied temperature, and their ever changing scenery; the balmy, growing days of spring; the hot, and busy days of sum-

mer; the crisp and yellow days of the harvest time; and the cold, keen days of snow and ice. Do not all of these affect the boy? Does he not change with the seasons, and do not his desires, his fancies, his work, his play, and his needs, all change with the seasons? Although the boy may not sense it in just this manner, it is the call of nature that it should be so. It is a natural instinct born with the boy. The things he wanted, and the things he wanted to do in summer are not what he desires in winter. Conditions are changed, the needs are changed also.

Why, then, do we not build our course of study around these conditions, or at least make it flexible enough to take care of the demands of the changing seasons at the proper time? We must not lay down a hard-and-set course of study, which is not in harmony with the laws of nature.

Seasonal work must always be cared for at the proper time. Good results should be practically assured because the greatest asset, namely interest, is already present from the beginning. In this work, advice and guidance are needed from the instructor; nature and the boy will take care of the balance. It may not always be possible to gratify the desires of the boy as well as to cover the succeeding model in your lesson plan, all in a single model. However, it is a poor model which does not teach something. The small boy suddenly wants a windmill. Is not this your golden opportunity to teach the half-lap joint? But, perhaps the lesson plan says he must make a butt joint first. What shall we do? Make the windmill, of course. He has to learn this step only once. The opportunity has presented itself and let us take care of it, then and we can teach the butt joint with the next model. There is a time for everything and we should endeavor to gain an advantage whenever opportunity presents itself.

The special job and the repair job both have their place in our work. To the boy, these look like real business. He is doing work now which a mechanic might be called upon to do. Mentally, he figures the cash value of this job, and is proud that he is able to do the work as well as a paid mechanic. Real interest is present here and he is doubly paid for his work. He has accomplished something and he is pleased and he has also saved the expense. The repair job has well served its purpose.

In arranging our lesson plans, let us have a large group of models to choose from for each step in our plans and be sure to include models which are typical of the current season of the year. If your groups are large enough, every member of your class will select a model in which he has a special interest for some reason of his own.

We should study the developing minds of these boys and keep pace with them. Are we as sensitive to "the call of the wild" which comes in the springtime, and to the sports which winter ushers in, as are these boys in our classes? If we are not interested in their work, shall we expect them to be interested in our work? We want to develop and broaden the boy in every way we can. We are not operating a trade school. We are aiming at the boy and not at the trade.

Every boy knows that there is a place before him in the community which he is expected to fill later on in life, and it is his business through his boyhood days, to fit himself to fill that place. He learns by doing and his experiences are measured by success or failure.

We live in an industrial age and in an industrial country. Our school systems have been accused of educating the young away from industry instead of fitting them for the industrial world, which now demands men of high professional training. Let us be sure we are doing our share toward giving these young fellows a fair start in the busy world today.

On the Delphic Temple, was engraved this motto "Know Thyself", and Socrates used this as the fundamental in all of his teachings.

He is reported as saying "know thyself, that is realize thyself, and be in fact, what thou art in possibility", and so we should look upon the boys in our classes, and study them, and know them, and endeavor to make them in fact, what they are in possibility.

The Organization and Administration of Part-Time Schools

S. J. Vaughn, President of Hardin Junior College, Mexico, Mo.

THE essential fact concerning the organization of the part-time school is that very much of the organization must be completed well in advance of the opening of school. There are so many complications that will arise; there are so many unsuspected minor considerations to be dealt with that the attempt to open the school without first clearing away these minor difficulties would end in confusion. And, at best, the part-time school problem is an extremely confusing one.

The first definite step is the organized means of getting the proper information to the public in general, to the boys and girls and their parents, and to the employers for whom the pupils are working.

The indispensable service which the local newspapers can render and which they are glad to render in putting the information concerning the provisions of the law and the value of such schools before the general public need hardly be discussed. Such a campaign of publicity must, undoubtedly, be started some weeks before the attempt to open the part-time school.

Another agency of proper publicity is the local Chamber of Commerce or similar organization. Such bodies are almost invariably glad to cooperate in such

a movement to the extent of sending letters of explanation to their members. Such letters should, of course, be prepared in conference with the local director of the part-time work. In this way the proper interpretation of the law and the needs of the new work and the employer's relation to both will be assured. It is doubtless advisable in such a letter to stress the effect of this new education upon the citizenship and general improvement, as well as upon the vocational significance.

If in the community there should be a Manufacturers' Association, a similar letter could be secured from its secretary to its members.

The next, and perhaps the most vital step in the whole publicity program, is the visit by the administrative officer to the employers. There are a number of purposes for such a visit. In the first place, it is one of the means of getting a proper list of the juvenile workers. The beginning, of course, is the school census. Almost invariably, however, such a census proves to be almost entirely inadequate for the part-time school purposes. In one city in the middle west the school census showed a list of 175 pupils within the part-time school age. At present in that city there are six hundred pupils in attendance and the number is steadily increasing. Another reason for the visit to the employers is the cultivation of the spirit of cooperation among the employers, and this is no small matter. Without their cooperation the part-time school will face endless and annoying difficulties. The attitude of the pupils will, to a considerable extent, be determined by the attitude of the employers. Furthermore, the law makes it entirely optional with the employers whether or not they shall pay the workers for the time spent in school. The administrator who visits the employers for the first time must be prepared to listen to rather wholehearted and bitter criticism of the public schools. Some of them are based on an element of truth, and some of them, of course, are simply distorted imaginings, but whatever they are, they are deep-seated and must be met. It gives the schoolman, therefore, an opportunity to meet in a diplomatic and constructive way the criticisms advanced. The visit will, furthermore, give an opportunity to discuss with the employers the most convenient days and hours for the workers to attend school. Very naturally, the attitude of the employer is at first antagonistic to the whole scheme. He unhestitatingly declares it impossible to conduct the business if it is to be broken into constantly by the taking away of the young helpers. However, after the proper discussion of the matter, any tactful administrator can establish the need of such a school and both the advisability and practicability of arranging for attendance. During this same visit the employers can be further cultivated by conferring with them concerning the kinds of work which the school can profitably offer to the youthful workers who are employed in their concerns.

The next step in the long process of getting a part-time school established is to visit the homes of the boys and girls who must, under the law, come back to school. Here again the school official must be prepared for an attitude of hostility. The parents of those types of boys and girls who quit school early and go to work are almost invariably ready to justify themselves by condemning the schools, by asserting that further education was unnecessary by questioning the right of the state to compel longer attendance, and by falsifying the ages of their children. When one has returned from such visits in the homes, one is considerably in doubt as to whether any good has been accomplished, but, on the whole, it seems the most effective way to get the proper information to the parents. Furthermore, by a most discreet handling of the matter the attitude of hostility can be either overcome or materially modified. A perfectly plausible case can be made for the value of further educational work on the part of the boys and girls, and definite examples can be used to advantage in convincing the parents of the advisability of additional schooling. Finally, the penalty of the law can be set forth in such a manner as to be deeply impressive.

Registration of Students.

After the proper publicity through newspapers, letters, and visits, the time comes for registering the students. Likewise, the registration would seem to be necessarily well in advance of the opening of school. In preparation for registration day the school officials will find it advisable, if not entirely necessary, to send notices not only to the boys and girls whose names are on the list of eligible pupils, but also to their employers. The most effective notice to the employers is the one which sets forth not only the day of registration but also the names of the workers in that concern who are due to attend.

It has been found advisable by those of longest experience to provide for registration both in the buildings where the particular students are to attend and in at least the larger of the establishments in which the children work.

Classification a Baffling Problem.

Perhaps the most baffling question of the entire part-time school is that of classification. The first impulse is to classify the pupils on the basis of their previous school work, and many part-time schools have been started on this basis. Since the pupils of from 14 to 16 years of age range all the way from the third grade, or lower, to the third year of high school in point of previous work, it would seem, on the face of it, almost impossible to classify them on any such basis. Perhaps we will decide sooner or later that the intelligence test, imperfect though it may be, will offer the best basis for classification, so far as capacity for advancement is concerned. Indeed, it has been fully determined in the schools of longest experience that so far as shopwork is concerned there may be but little difference in the part-time school between the student who quits school in the seventh grade and the one who remained to the sophomore high school year. So the

grade scheme of classification seems wholly unreliable for the purposes of this new organization.

Among the other considerations beside that of mental capacity to be taken account of in classification may be mentioned the conscious needs of the individual, his imagined needs, the unquestioned needs from the standpoint of the community, and certain desires on the part of those who employ the pupils. If attempt should be made to meet every real or imagined need of the pupils, the employers, and the instructors, it would require an almost hopelessly elaborate organization, equipment, and teaching force. In the commercial and industrial pursuits alone, in a moderate-size city, there have been calls for from fifty to sixty separate and distinct lines of work.

When the pupils have definitely determined upon a recognized occupation in the commercial or industrial field, it would seem not only the desirable, but the logical thing to relate his school work as nearly as possible to his daily occupation. This is not wholly a vocational consideration. It seems the most obvious avenue to the interest of the individual, and in the commercial lines it is not an extremely difficult matter to provide both facilities and a teaching force. When the industrial field is reached, however, the variety is so great and the occupations are so highly specialized that it seems not only inadvisable but almost impossible to provide for many of the specific needs. It would seem, therefore, wise to make provision for certain fundamental occupations in which experience may be given both for the purposes of trying out the likes and aptitudes of the pupils and for the giving of definite trade extension work.

At the beginning of the attempt to classify the students it has been found advisable to deal at separate times with the more or less well defined groups into which the pupils fall. Perhaps those that have had some high school work should be dealt with at one time, those that finished the grammar grades at another, and those who fell by the way long before reaching the eighth grade at another.

Even after this much of the classification has been accomplished, there are two well established methods of proceeding. One is to put all new students into an entry, or a so-called reservoir, class. In such class or classes the pupils are put through similar experiences in various lines of work. This gives the teacher the opportunity to observe the pupils at their work, to take account of their apparent aptitudes, and to take note of the obvious misfits. In all this work the teacher's visits to the places of work and to the homes help to verify the conclusions based upon the class experiences. During a limited time, anywhere from two to six weeks, the pupils are supposed to find work to which they are best adapted and in which they are most vitally interested. When they have thus found their work and their interest, they are organized into classes in the lines for which they have shown the greatest aptitude and interest.

In the other method of procedure the classes are organized at the very beginning and the pupils are started on the work which they are supposed to pursue. Of course liberal chances are given in either case to transfer from a type of work for which they seem unfitted to something that more nearly meets the needs and aptitudes of the particular students.

Thus far it has been considered largely from the standpoint of the commercial or industrial activities in which they may engage. A very large percentage of the part-time pupils, however, are in need of what is known as general continuation work; that is, such work as resumes the school subjects that were dropped when they left school. In this case, as in the other, a very large part of the work will necessarily be on the individual basis. The variety is so great, the aptitudes are so diverse, and the school experiences are so different, both in point of time and character, that it seems well-nigh impossible to deal with them in the mass.

It is well to remember, furthermore, that new pupils are daily entering the part-time school and that the old ones are dropping out as they reach the age of 16, hence the matter of classification is a perfectly continuous process. It would seem, therefore, to be necessary to organize the work of the part-time school in perfectly definite units to be completed in a definite and limited period of time. This does not preclude the idea of an instruction order. It simply suggests the instruction order in the arrangement of the units week by week.

At best, within a very limited time after the beginning, it will be found necessary to make many and radical readjustments. In some cases almost a complete reorganization has been found necessary, due to a lack of complete information concerning the work of the pupils. For a perfectly intelligent classification and assignment to work it would seem wholly necessary to know in great detail just what the work is in which the individual is engaged and exactly what his duties are in connection with that work. Perhaps this is the most difficult item of information to get, and if left to the individual pupil to furnish the detailed information very unsatisfactory results will be had. Perhaps the only sure way of getting sufficiently accurate information concerning the pupils' work is for the school official to get the data on the visit or visits to their places of employment.

Schedule of Days and Hours.

In the conferences with the employers it is well to get a perfectly clear understanding with them as to the most convenient times for the pupils to be absent from their work. Quite generally, especially in the commercial and sales work, the employers are quite averse to Saturday classes; hence, it is just as well to avoid this difficulty at the very outset. Where the time is eight hours per week, as it will be in Illinois, the most satisfactory arrangement, both from the standpoint of the

school and of the employers, is the two-shift arrangement; that is, each pupil will come to school on two different days, spending four hours on each day. The usual arrangement is for the pupil to spend the morning of one day and the afternoon of the other day. In this manner the employers are not under the necessity of leaving the same machines idle at two different times. Thus the loss of service would be distributed. In those states where the four hour per week schedule is in operation it is much more satisfactory from the standpoint of all concerned to have the four hours of school work in one-half day for any particular pupil.

Administrative Organization.

The concensus of opinion is that the part-time school problem in centers of considerable population is sufficiently complicated and is sufficiently distinct from the regular school to make a special part-time director or administrator desirable, if not entirely necessary. Hence in many of the larger centers the administrative officer is an assistant superintendent in charge of part-time schools. In some places a director of part-time schools is appointed. In still others an assistant is appointed to the high school principal and placed in charge of the part-time problem. In all these arrangements there is no decided division of opinion.

There is one phase of the part-time problem, however, that excites the most spirited discussion, and that is as to whether the part-time school shall be a separate and distinct institution under a separate control, or shall be simply a part of the regular system and an element in the regular high school. Those who contend for the separate facilities and administration point out that the part-time school is essentially different in every way from the regular public school. It must be dealt with, they say, in a wholly different way. Especially in the vocational aspects of the part-time school the contention is made that the purposes and traditions and facilities of the regular high school are all distinctly inconsistent with the aims of the part-time school. There is a feeling, moreover, that by combining the part-time school with the regular high school the former would be essentially hampered in its activities. Furthermore, in undertaking the work as a part of the regular high school, attempts are quite generally made to use the regular teaching force of the high schools in the part-time classes. This, contend the advocates of the separate scheme, would certainly destroy the purpose and efficiency of the work, especially in those lines designed to be vocational.

On the other hand, the advocates of the unit element, whereby the part-time school is housed in the same building with the regular high school, emphasize the principle of democracy in education. They contend that it is essentially undemocratic to take groups of boys and girls from the working world and deal with them as a separate unit in our educational system. They are disposed to feel that the greatest influence in the matter of social values and preparation for citizenship in a community is exerted by the mere association of the part-time pupils with those in the regular high school classes. The association, of course, for the most part, does not occur in the classroom, but rather in the gymnasium, on the playground, in the assembly hall, in social functions, in the corridors, and in those general contacts of student life in the same institution.

So far as the part-time school in 1921 and 1922 is concerned, the essential considerations are: First, tiding boys and girls over a very difficult period in their lives; second, keeping the mind plastic and preserving those school arts and skills acquired in their previous attendance; third, giving boys and girls of this difficult period all possible advice and guidance and help in the selection of proper work for their future; fourth, providing at least a start in the preparation for the selected future work; fifth, providing through all these efforts as much general education as possible that will function in the making of better citizens.

It will be seen, therefore, that, for the present, the ideals of the part-time school are essentially one and the same with those of the regular high school. Therefore, the question of separate or unified management is a question of method. It is a question of the best means by which these perfectly worthy objectives may be attained.

Granted sufficient room, adequate facilities, and a competent teaching force for the very special lines, the unified arrangement undoubtedly has many advantages which the separate plant would not furnish. These advantages, to be sure, are on the side of the social contact, the democratic intermingling, and the consequent training for citizenship in a community. The separate scheme undoubtedly has the advantage in cases of intensive effort in the direction of vocational efficiency, but under the proper arrangement there is no essential reason why the same ends may not be reached by the unified scheme.

The Organization of Teaching.

The entire scheme of organization and administration must, in the very nature of things, be somewhat dependent upon the method of organization for teaching purposes. This phase of the work is just in the process of formation. In the states where the part-time work has been in existence for some time, two rather distinct ideas are in use. In the one case the departmental plan is the basis of the teaching scheme. In the other the plan of the single teacher for a limited group of pupils is being used. Under the departmental plan the regular scheme in operation in the high schools is being used. The feeling is quite general now that the defects of the departmental teaching are tremendously exaggerated in the part-time school. This much is true: For a great percentage of the part-time pupils the ordinary procedure of the school seems not to bring a sufficient reality to hold the attention and get the best results. Consequently it seems that the departmental or subject organization over-formalizes the work and

renders it so abstract as to be ineffective for the purposes of this class of pupils.

In some organizations the project idea has been adopted in its most extreme form. Under such an arrangement the individual is put into the shop or industrial or commercial work as a center for all activities. The same teacher that teaches the shopwork gives the instruction in mathematics, science, and English. The presumption is that these academic elements will receive the proper attention at the time when they become vital to the project in hand. This is open to the very grave charge that those elements of general culture so necessary to citizenship and social life are seriously neglected, or at least subordinated to the casual and sometimes accidental demands of the industrial or vocational work. The reply which the advocates of this scheme make is that whatever the students get of those elements of general education they get in vital contacts with real situations in life.

Under such conditions, they say, the student gets these necessary elements of general education in a way that fixes them permanently in their minds and experiences, whereas under the separate departmental arrangement the so-called subjects remain abstract, unrelated, and foreign. Without doubt, the one teacher-project arrangement has many elements of real strength, but it would seem that its success would depend wholly upon the unusual endowment, preparation, and versatility of the teachers who must handle the work. At the outset, at least, it would seem advisable to concentrate the efforts on the satisfactory organization, the skillful classification of the pupils, the elimination of all possible uninteresting and abstract material, and the securing of the most skillful, sympathetic, and versatile teachers that can be had. Then, as the work proceeds, attention can be turned to the possibility of changing the teaching organization from the subject scheme to at least a modified system of project teaching.

A Model Steam Engine as a Shop Project

Frank Moeser, City School Department, Buffalo, N. Y.

(continued from September)

Main Bearing.

The base of the main bearing was faced off by grasping it in the chuck of the lathe. A center drill was used to drill a center hole in the face, and by inserting the tail stock center of the lathe a rigid job was produced. It was necessary to see that the face was running true. This could be accomplished very easily by changing the position of the chuck jaws. One cut was enough as no particular thickness was required on this part.

After the base had been faced true, the bosses or bearings were laid out to the proper height. It was then clamped upon an angle plate; the bearings were set square with the table to have the shaft hole in the center of each bearing.

A 9/16" hole was drilled through each bearing and reamed out with a ⅝" reamer. While the bearing was set up on the angle plate, a spot facing tool was used to face off each side of each bearing. All that remained of the machine work was to drill the screw holes in the base and to drill and countersink the oil holes in the bearings. The operations are as follows: (1) Chuck up true; (2) center up the base with a center drill; (3) face off true; (4) lay out bearing holes and square up on the angle plate; (5) drill, ream and face the bearings; (6) lay out, drill and countersink the oil and screw holes.

Crank.

The crank can be made in either of two ways shown at A and B in the detail drawings. If made like the drawing A, a groove can be cut in the center of the outside rim which can be used for a belt to drive various small implements. Either crank will work on the engine but that shown at A requires a few more operations.

Type "A" Crank.

Grasp the crank in the chuck by placing the hub between the jaws. Face off the outside and turn to the diameter. Drill a 9/16" hole through the center. Bore out this hole until it runs true and ream it with a ⅝" reamer. Press the crank on an arbor, face the opposite side and turn the hub true. Cut the groove for the belt and remove it from the arbor. Lay out the crank pin hole, drill with a 31/64" drill and ream with a ½" reamer.

Type "B" Crank.

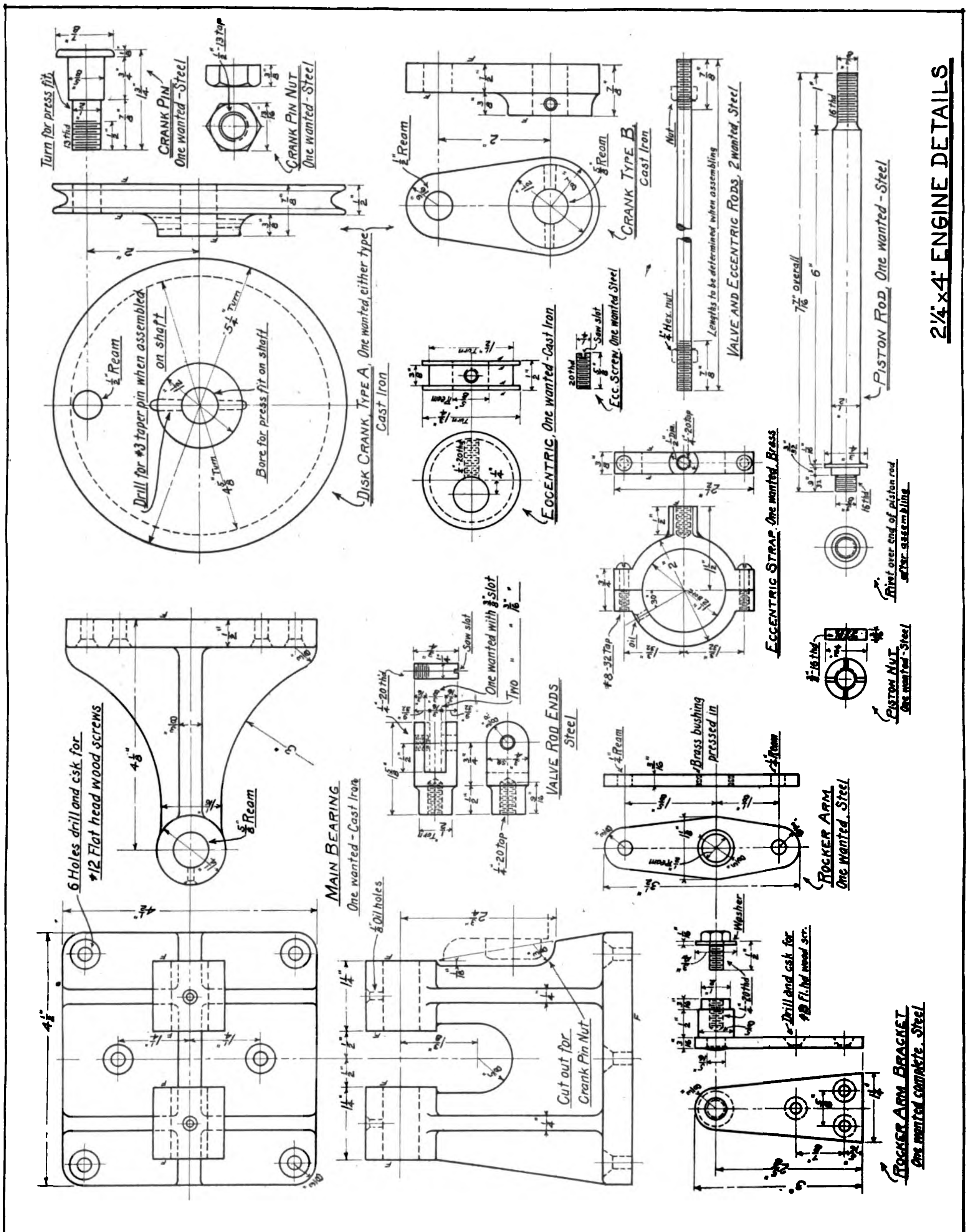
Grasp the crank in the chuck as described above. With the exception of cutting the groove, this type of crank is finished in the same way as the type "A" crank, which is as follows: (1) Chuck up true in the chuck; (2) face the side and turn outside diameter; (3) drill, bore and ream a hole; (4) press on the arbor to face the opposite side and cut a groove; (5) lay out, drill and ream the crank pin hole; (6) grind and file the outside edges smooth. The sixth operation is only for the type "A" crank.

Rod End Pins.

The rod end pins were made in the same manner as described for making the valve rods. After threading to the proper length, they were placed in the drill chuck, the ends were rounded off with a file and polished with emery cloth. The screw slot was cut in with a hack saw.

Valve Rod Ends.

The ends for the valve rods were made from ¾" square cold-rolled steel, cut from a bar. Each piece



was chucked up true in the chuck and the end turned to ½" diameter ½" long. The hole was then drilled in the end and tapped out with a ¼" tap. It was then removed from the lathe, the slot sawed and filed and the holes in the side laid out, drilled and tapped. The ends were rounded off on an emery wheel and filed smooth.

The necessary operations are: (1) Saw off three pieces; (2) chuck up true; (3) turn the end to ½" diameter ½" long; (4) drill a 13/64" hole 9/16" deep and ¼" twenty threads; (5) saw and file the slot; (6) drill and tap a hole in the side; (7) grind, file and polish.

Rocker Arm and Support.

The rocker arm and support were made from 3/16" x 1-¼" flat cold-rolled steel. A center line was scribed through the center and the radius on each end was laid out in the proper place. Most of the metal on the corners was removed by grinding on the emery wheel, after which the pieces were finished with a file

and emery cloth. The holes were then laid out, drilled and reamed. The center hole in the rocker arm was finished 1/8" larger than required and a brass bushing was inserted in the hole. The reason for this was explained to the boys and a demonstration was given of the effect on working parts, when two pieces of like metal are worked together.

Eccentric.

The eccentric of the engine was first drilled and reamed in the drill press. It was then pressed on an arbor and the sides were faced to the right thickness. For finishing the outside diameter it was necessary to make a special arbor.

A piece of one inch round steel was cut four inches long and centered on both ends. It was then turned to 5/8" diameter three inches long and both ends were faced off so that very little of the original center holes remained in the ends. To lay out the eccentric centers place the arbor in a V block and set the scriber of the surface gauge exactly in the center of the arbor. Scribe a horizontal line across each end of the arbor. When this line has been marked, rotate the arbor one-quarter of a turn and use a square to locate the line in an exact vertical position. Now raise the scriber of the surface gauge 1/4" and mark each end as before. At the intersection of these two lines mark with a center punch and drill the holes with a combination center drill. If care is taken when drilling the center holes this arbor will do the work very nicely.

Care must be taken when pressing this arbor into the eccentric to see that the eccentric center of the arbor is in the right position. When it has been determined that the arbor is in the proper position, turn the outside diameter to size and cut the groove. Remove it from the arbor and drill and tap the holes for fastening to the shaft.

The necessary operations are: (1) Drill a 19/32" hole, ream 5/8", 1/4" off the center; (2) press on the arbor and face the sides to the thickness; (3) press on the eccentric arbor and finish turning; (4) drill 13/64" holes and tap 1/4" twenty threads.

Eccentric Strap.

The eccentric strap required but very few setting-up operations. The holes on the two side lugs or bosses were first laid out and drilled with a No. 28 drill. The strap was then sawed in half and the side without the center lug was tapped out with an 8/32" tap. The holes in the side lugs on the other half of the strap were drilled with a No. 18 drill, and the two halves were filed, fitted and screwed together.

The center lug and the end were then centered up and drilled with a center drill. It was placed between the centers of the lathe and the center lug was turned to 3/8" diameter. This provided a gauge or stop which was very helpful when facing the sides. The strap was then grasped in the chuck and finished in the following manner.

By placing a small piece of steel between the strap and the chuck jaw opposite the end with the center lug, it was possible to bore the hole to the proper diameter and face both sides of the strap without removing it from the chuck which insured an absolutely parallel job. For the inside facing a hook tool was used.

The operations are as follows: (1) Lay out and drill the side lugs; (2) saw and fit up two halves; (3) drill the top half with a No. 18 drill and tap the bottom 8-32 tap; (4) center both ends; (5) turn the center lug to 3/8" diameter; (6) chuck up true and bore a hole; (7) face inside and outside to the proper thickness; (8) drill the center lug with a No. 12 drill and tap 1/4" twenty threads.

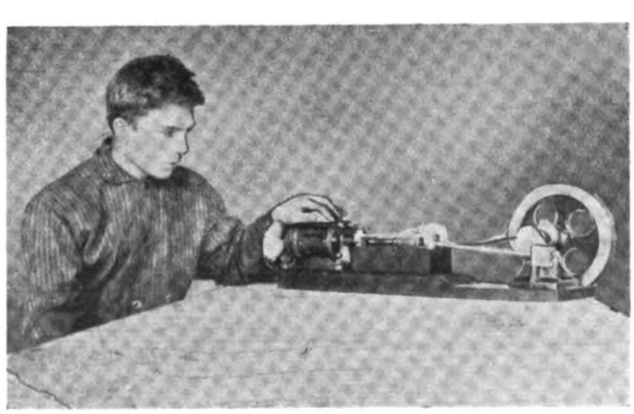
Crank Pin.

This can also be made in one of two ways. If it is made in the chuck as described under directions for the cross-head pin, more or less waste of material will result as there are very few small lathes with a spindle large enough to allow a 3/4" rod to pass through the spindle. The best way is to make the crank pin and cross-head pin in one piece, allowing enough metal for parting in the center.

The successive operations are: (1) Center both ends; (2) rough turn all diameters; (3) finish turn all diameters; (4) cut the threads on both ends; (5) face off 3/4" end on crank pin, file and polish; (6) face off end on cross-head pin and cut the screw slot.

When facing off the ends of these two pins, it will be necessary to grasp them in the chuck on the finished parts. In order to avoid the marring which would ensue, a thin piece of tin or brass should be wound around the pins before they are placed in the chuck.

(To be concluded.)



ENGINE PRODUCED BY ONE OF THE AUTHOR'S STUDENTS.

Business Management of an Industrial Arts Department

Burl N. Osburn, East Junior High School, Sioux City, Ia.

PROBABLY no business could be successfully run with so little regard for business methods as the average industrial- or manual-arts department. Strict accountability is the exception rather than the rule. Systems in use run the gamut from the "memory plan" to very expensive and complex systems. If a curve were to be plotted showing the distribution of departments with regard to their business methods, the skew of the curve would no doubt be near the memory method.

There are several factors which seem to contribute to this condition, such as: (a) The lack of standardization; (b) insecure and short tenure of position on the part of the teachers; (c) inability of those in charge to devise and maintain a system.

The number of school departments having no system at all is probably equalled only by the number which have one that will not work. These unworkable systems are usually so because of one or more of the following reasons:

1. There is no definite purpose underlying the plan.

2. The idea was taken bodily from some other school and will not work in the new environment.

3. The plan was not worked out carefully on a basis of needs.

4. The human element was not considered. These systems usually make no allowance for possible variations that will arise; or, may require so much clerical work that they cannot be kept up-to-date and are finally discarded as worthless.

5. The system was too complicated.

A system to be successful must include the following essentials:

1. The plan must be clearly comprehensible.
2. A minimum of clerical effort must be required.
3. Useless data must be eliminated.
4. The plan must be easy of access.
5. No highly involved or interrelated parts must be permitted.
6. Forms of practical size and arrangement must be provided.
7. Adequate filing facilities must be installed.
8. Satisfaction must be assured to all, both pupils and teachers.
9. The operation of the system must not be dependent upon the memory of pupils or teacher.
10. Responsibility for all transactions must be fixed.

No fixed and invariable statement can be made of the details that need to be considered in any one sys-

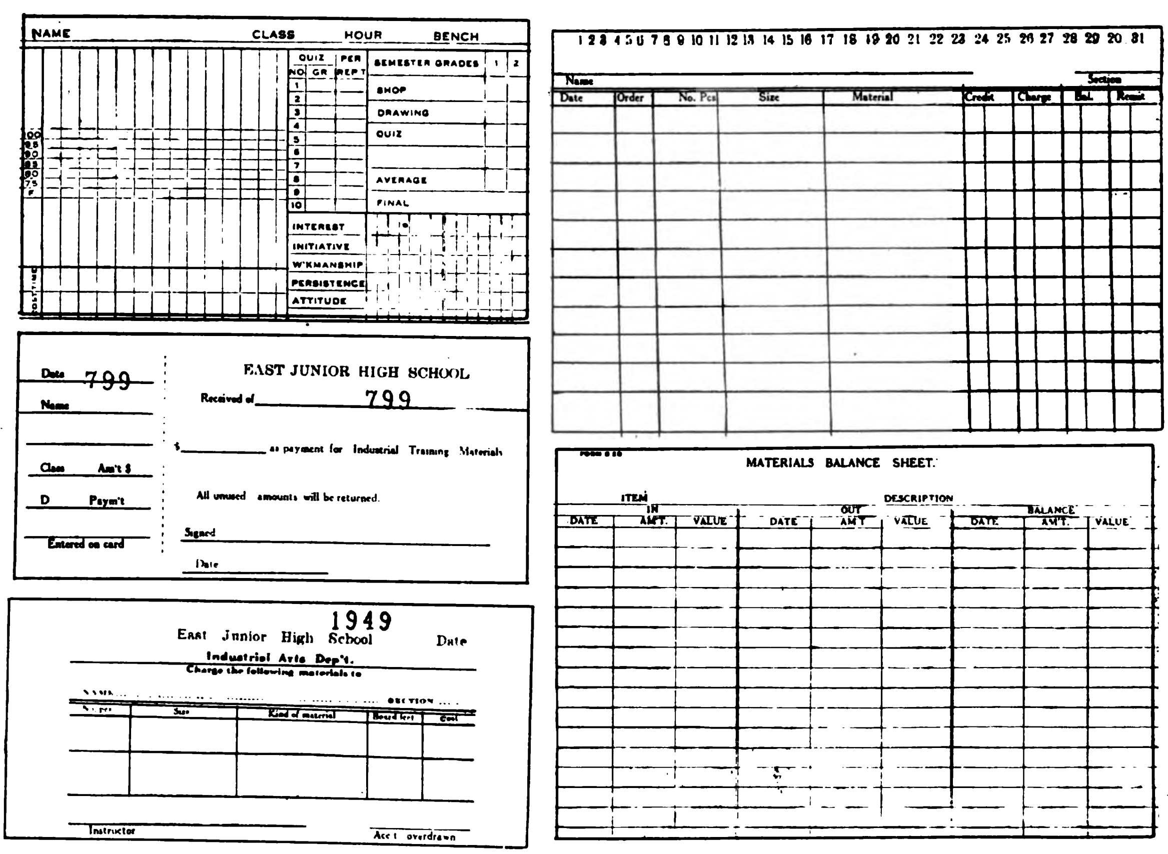


FIG. 1 (TOP LEFT). CLASS RECORD CARD. FIG. 2 (TOP RIGHT). PUPIL'S CHARGE RECORD. FIG. 3 (LEFT MIDDLE). RECEIPT FORM. FIG. 4 (LOWER RIGHT). STOCK CARD. FIG. 5 (LOWER LEFT). CHARGE SLIP, MADE OUT WHEN ISSUING MATERIAL. IT IS SIGNED BY THE TEACHER AND OK'D BY THE PUPIL.

tem, but there are a few that no sytem may omit. These are briefly records of (a) pupils, (b) materials, and (c) equipment.

A. Records Dealing With Pupils.

These include: 1. Attendance.

2. Work in progress.

3. Periodical grades (monthly, or some regular interval).

4. Administrative devices (a) list of bench numbers, (b) list of tool numbers.

All of these things may be kept in the standard class book, although many schools use some form of printed card such as is shown here. (Fig. 1.)

5. Permanent record of each pupil. This should be kept in the department, and should record courses, grades, credits, special abilities, work covered, etc.

6. Materials issued to each pupil. This matter is partly discussed under the heading of materials. Regardless of what method is used, there needs to be some record of every purchase, return of materials, or cash paid by the pupil. It generally simplifies matters if these records are kept together in a ledger, or on a card, in some manner, so that a boy may know at any time whether he owes the department money. If all accounts are left until the end of the year, there is too much work to figure then, and often it isn't done. A sample of such a record is shown in Fig. 2. The money paid in by a pupil should be balanced by a receipt. Thus the pupil feels safe and the department has an additional check. A receipt is shown in Fig. 3. All items on charge slips and all money as shown by receipts are entered on individual account orders.

B. Records Dealing With Materials.

1. *Requisitions* may be only blank paper, or printed forms, but should be made out in duplicate. In localities where the department sends out its own lists for bids, as many copies are needed as there are prospective bidders.

2. *Materials received by the department.* These may be listed in some manner together with the cost, date of receipt, etc. A ledger is convenient for this. Or items may be entered directly on stock cards similar to the one shown in Fig. 4.

3. *Materials issued.* Materials used for the department should be listed separately by jobs and the cost charged to installation and repair. Issuance of materials to pupils and charging them is generally the big problem. It is advisable to keep materials where pupils cannot get them, or let it be understood that they are not to help themselves. Any supplies should be given out by the instructor or someone especially appointed to do it. The record of the materials should be made *at the time* issued, and not later. Yet there is the rub, because to do this takes time and delays the classroom work of the teacher. If it can be done by a responsible pupil all well and good, but in case the teacher makes out the charge slip, if one is used, it should be of such a form as to require the minimum of time and attention. Such a one is shown in Fig. 5. These are copied on to the individual record cards. These might be made out by the teacher and O.K.'d by the pupil. In either case the slips should be filed and kept as a protection to the department.

4. *Periodical inventory.* This inventory may be taken yearly or by semester, and should show a classified list of all materials and supplies in the department and their value.

5. *Budget.* The regular budget consists of a list of all supplies that will be needed for the coming year. It is made out on the basis of materials needed for the courses and prospective enrollment.

Another form of budget is the "call" list. A pad of paper in some convenient place or a desk calendar will do for this. It consists of a list of materials or tools that are needed at once and that have not been included in the budget proper.

The "system" of allowing the pupil to get his own material and then figure it up later at the time he takes it home puts the premium on the waster, and is very inaccurate and costly. The cost of the department must be balanced and the pupil who uses the material should pay for it.

Several methods of payment are in use. Perhaps the most common is the coupon book. This has the advantage of requiring little clerical effort and is convenient in courses requiring a small outlay on the part of the pupil, providing some method can be devised of keeping it where it may be had when wanted.

These books have the disadvantages of: 1, being easily lost or destroyed; 2, being too often not on hand when wanted; 3, being inadequate for courses requiring a larger outlay.

In case of purchases exceeding the value of the coupons in the book, some method of carrying the credit must be used, or the time is wasted while the pupil brings the money. Carrying credit in these cases usually means in the mind, or on a convenient scrap of paper.

It is impossible to account for materials that are returned by the pupil, and for which he should receive credit.

Another system of payment in quite common use is that of charging a fixed sum as a fee from everyone regardless of what he uses. This is a convenient method as far as time required to keep it up is concerned, but it is unfair to those who are saving with materials. It is not conducive to careful planning or cutting, and often develops the spirit of "being sure I get *my* money's worth."

C. Records Dealing With Equipment

1. *Periodical inventory.* This should be made out at the beginning and end of every school year. It should not be only a classified list of tools and equipment, but should show the condition and estimated value of every tool or machine.

2. *Broken or lost equipment.* The cost of any broken or lost equipment should be applied to the account of the pupil responsible, and in case a ledger

account card is used, it can be entered just as any other item.

3. The most used item in connection with a record of tools is that of the *Current Checking System* by which a record is kept of tools in use during the class period. Many shops use the "open" type of tool case which requires no checking of the tools issued. Others use the "closed" equipment case which calls for a tool-keeper who issues tools upon request of pupil, or order from the instructor, and checks them in some manner. The closed equipment case is probably more satisfactory in most ways, although it is often too slow. Boys in a hurry to begin work are delayed in getting their tools (and an impatient boy is an additional problem), and at the end of the class period, tools are often turned in and the borrowers rush away before the tool-keeper can check them out.

Any of these objections holds true with any method which can be devised if the teacher is not strong enough to hold the class to its job, but the better and faster the system works, the less the necessity of any discipline.

The first requirement is to have the toolroom located in such a way that no delay is caused by boys conflicting with each other. Similar tools should be grouped together, those in most common use nearest to the tool window. Some method that will fix the responsibility for the borrowed tool must be used. This sometimes is done by having a panel with hooks holding checks, arranged in numerical order, one set of checks for each pupil. When a tool is borrowed, the tool-keeper puts one of the boy's checks on a hook near where the tool was removed. Another method is to have a common brass-bound price tag hanging near each tool, with the name of that tool on it. When the tool is borrowed, the tag is placed on a hook that is numbered with the boy's tool number.

STATEMENT FOR MANUAL ARTS

DEPARTMENT FOR SEMESTER ENDING ________

Value of supplies on hand at beginning of semester ________

Value of materials received ________

Value of materials on hand at end of semester ________

Net cash received from pupils ________

Value of materials used for instal. and repair ________

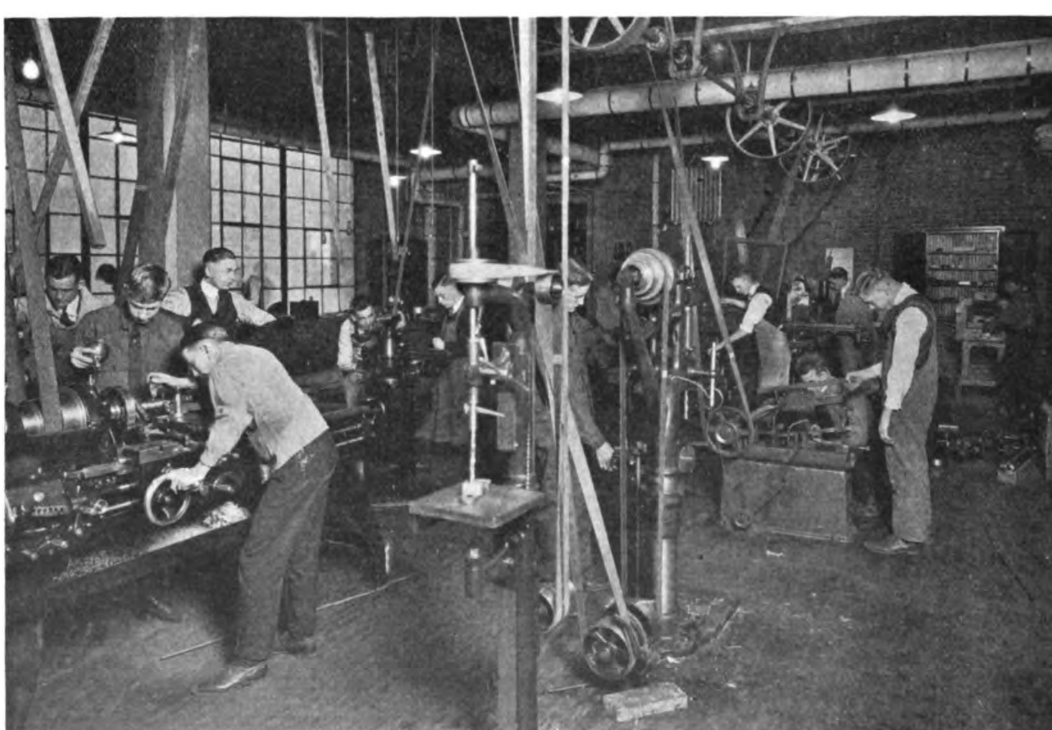
Cash received for broken or lost equipment ________

FIG. 6.

Finally, each department should attempt to balance its books periodically. It is not possible to account for every stick or penny, but a reasonably accurate balance can be found. A sample of what is meant is shown in Fig. 6.

In order to successfully apply any system to a department, it is necessary to select only those things to be recorded that are necessary in enabling it to keep an intelligent record of its transactions.

If possible, have all forms standardized in the school and printed, and most of all, remember that no system will run itself. It requires time and effort to keep up if it is worth while. In fact, it imposes that as an obligation.



MACHINE SHOP IN ROCK ISLAND HIGH SCHOOL, ROCK ISLAND, ILL.
Mr. A. W. James, Supervisor.

Home Made Machinery for Manual Training Shops

Charles W. Frost, Philipsburg, Mont.

THE possibility of supplementing the factory built equipment of the manual training department with inexpensive, home-made machines and appliances was suggested by finding such a "home made" circular saw in the manual training department of Granite County high school.

This machine, built by Mr. Harold Durst, a former teacher of manual training here, had been in use three or four years, and was still doing as good work as any factory-built machine after a similar period of service.

Ripping, cross-cutting, dadoing, sawing angles and tenons, and in short, anything that can be done on an ordinary circular saw could be done very nicely with this machine. Owing to the thinness of the saws used (which Mr. Durst had filed from Disston hand saw blades), this little machine did better work in cutting hard, thin, lumber and veneer than any power saw with which I am familiar. It would rip and cross-cut stock up to one inch in thickness easily and quickly.

A careful study of the methods of construction employed proved that it would be quite feasible to build other machines, needed for the department, at a fraction of their cost if purchased from the factory. This was a very important consideration, for while the school board would not consider purchasing such machines at this time, it had no objection to the use of the small amount of lumber and hardware required to build them.

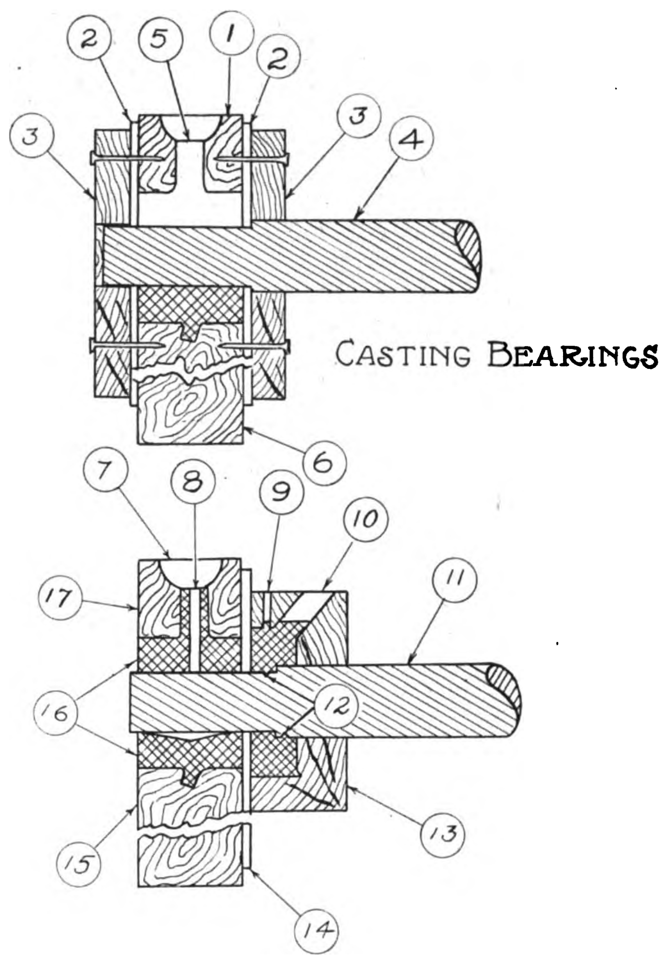
The machines so far made and in regular daily use, are, a jig saw, a combination spindle-sander and disk trimmer, and a belt sander. A swing cut-off saw will also be built. In the following pages are drawings showing details of construction, lists of materials required with prices paid, and wherever it is thought that such would prove helpful, suggestions as to procedure.

Dimensions of different parts and other details, may, of course, be changed to suit the requirements of the builder, or as the limitations of the materials on hand make necessary.

The same general methods of construction were carried out in all the machines. The frames are all built with post 3½ inches square connected by rails of various widths, but all one and a half inches thick; with tenons five-eighths of an inch thick by two inches long. Half inch dowel pins are glued through the posts and tenons at each joint, and the frames are also reinforced with three-eighths inch carriage bolts wherever the use of such bolts will add strength or rigidity to the machine.

Shafts are made from abandoned automobile axles, turned to the required size and shape. The bearings are all of babbitt metal set into the wooden rails, and the collars on the shafts are also of babbitt. The machines are finished with a coat of oil shellac over one of black wagon paint.

PLATE A.



CASTING COLLAR

Making Babbitt Bearings.

Although the problem of setting babbitt bearings in wooden rails may be new to some, the process is so simple that no difficulty should be experienced in carrying out these suggestions successfully the first attempt.

At the required point in the top edges of the rails saw square notches about an inch wider and half an inch deeper than the diameter of the shaft. With a quarter inch bit bore two or more holes, at different angles, into the bottom and sides of these notches. These are the "anchor holes" into which the melted babbitt metal runs (when the bearings are poured) forming prongs integral with the metal in the bearings, thus serving to hold the latter firmly in place when the machine is in use.

Instead of sawing these square notches the pieces of wood used as caps for the bearings may be fastened firmly in place with lag screws, as when the machine is finished, and holes the proper diameter bored with an expansive bit.

Bearings should be at least half an inch in thickness, and three-quarters of an inch is even better for use in wooden rails.

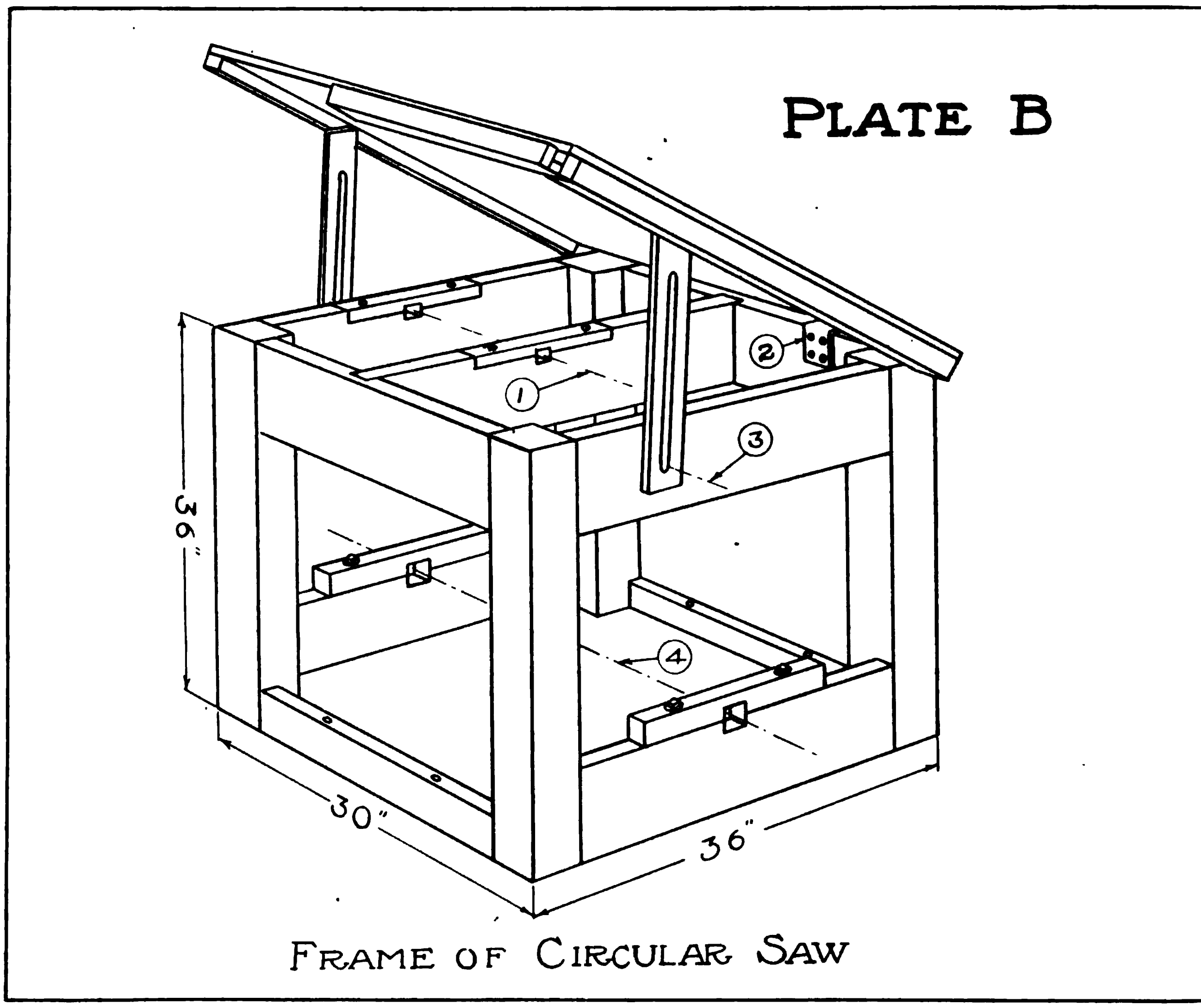


PLATE B. FRAME OF CIRCULAR SAW.

Plugging up the ends of these notches in the rails, and at the same time holding the shaft in the position it must occupy in the machine, is done by slipping a washer of heavy cardboard (with a hole the exact diameter of the shaft), on to the shaft on each side of each rail. Reinforce these washers with thin wooden pieces bradded and clamped tightly to the rails. Plate A.

Babbitt cannot be poured into the wood at as high a temperature as it can into iron boxes, because the wood will char and be ruined; therefore wait until it turns to a bright silver color before filling the spaces around the shaft level with the tops of the rails.

Wait until the babbitt has hardened, remove strips of wood and cardboard washers from the ends of the bearings, lift the shaft out and smooth the metal down level with the top edges of the rails.

The top part of the bearings are cast in much the same manner. Bolt the caps in their places with two or three thicknesses of cardboard between them and the rails, and covering the bearings in the latter. Plug up the ends with cardboard washers and wooden blocks as described above, and pour the babbitt into the mold thus formed through a hole in the top of the cap.

The bearings are next scraped level; oil channels cut; and oil holes drilled through the metal stems formed by the babbitt hardening in the pour holes.

Making Babbitt Collars.

Collars to prevent shafts slipping endwise are made by pouring babbitt into molds on the shaft. To construct the molds bore holes in soft wood blocks as deep as the collars are to be thick, and an eighth of an inch wider than the finished diameter. Bore another hole with the same center, using a bit the exact diameter of the shaft. Place the blocks on the shaft, with the holes of larger diameter adjacent to the sides of the rails, and clamp tightly to the latter, with heavy cardboard washers between them and the blocks of wood. Bore a quarter-inch "pour hole" in the top of each block, and smaller air vents near it, then fill the mold with babbitt in the usual manner. (See Plate A.)

Split the blocks from collars, place shaft back in lathe, and turn them down smooth and square. The ends of the shaft can be fitted into wooden chucks and the babbitt turned down with an ordinary chisel on a wood lathe, if no engine lathe is available. Babbitt cuts quite easily with a turning chisel and does not nick its edge or draw the temper.

Collars are "anchored" by filling shallow "V" grooves in that part of the shaft which they are to cover. (Plate A-12.)

Names of Parts.

Plate A.

1. **Cap.**
2. **Cardboard washers.**
3. **Wooden reenforcement to washers.**
4. **Shaft.**
5. **Pour hole.**
6. **Rail.**
7. **Oil cup.**
8. **Oil hole.**
9. **Air vent.**
10. **Pour hole to collar mold.**
11. **Shaft.**
12. **Collar anchor notches.**
13. **Collar mold.**
14. **Cardboard washer.**
15. **Rail.**
16. **Babbitt bearings.**

... **Cap.**

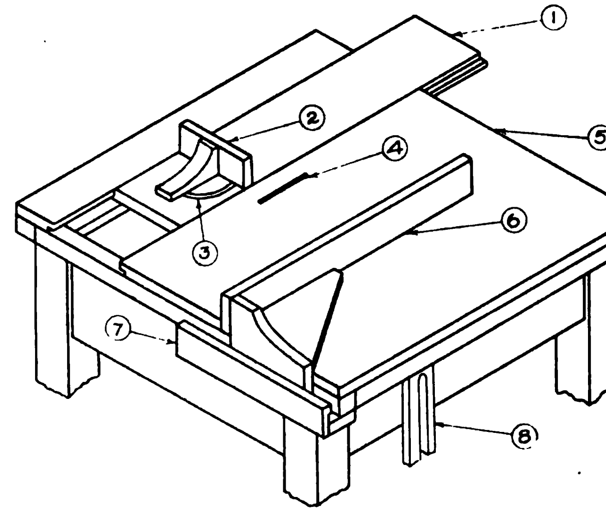


PLATE D.

THE CIRCULAR SAW.

A home made circular shaw can be utilized for much of the lighter work of the manual training department, supplementing the heavier machines, or, where funds are limited, taking the place (at least temporarily), of the factory-built saws.

It would also prove a profitable investment as an individual machine in the planing mill or cabinet shop for all sorts of light work. Such a machine placed near each workman's bench would save a great deal of time usually spent in walking to-and-fro between the bench and large saws, and eliminate the time wasted waiting for a chance to use the latter.

It would be quite as simple to build a saw to perform the heavier work of the shop, if such was desired.

Explanations of the operation of the saw is considered unnecessary, as it is practically identical with that of other circular saws, and it is thought that the drawings of the saw together with the details of construction given in the first part of this article illustrate the manner of construction quite clearly.

To obtain the best results a circular saw should have a rim speed of approximately nine thousand feet per minute. This necessitates a speed of 6,800 revolutions per minute with the five inch saws such as the machine in this school is equipped with. The diameter of the pulley on the saw arbor is limited to two and

PLATE C

SAW ARBOR

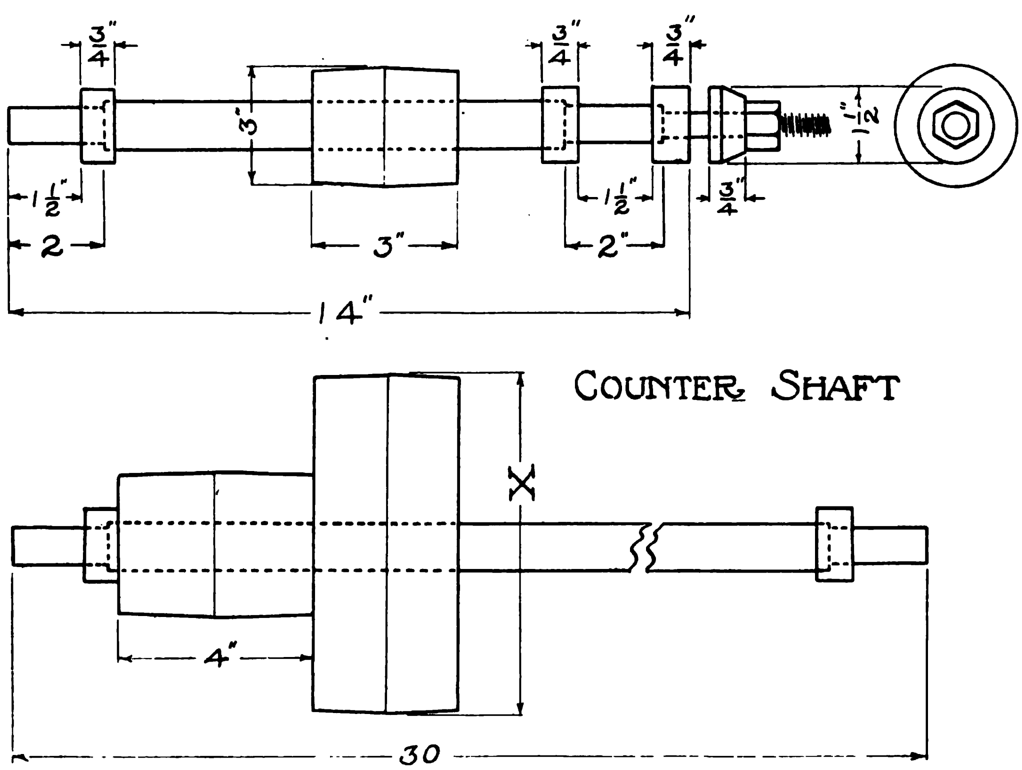


PLATE C. SAW ARBOR AND COUNTER SHAFT.

one-half inches by the necessity of keeping the belt running over it below the surface of the saw table. A larger pulley would, of course, increase the power available but would have to either project through the table, thus interfering with the use of its entire surface, or it would be necessary to set the rails carrying the arbor bearing lower in the frame. This would require the use of larger saws (which could hardly be made from the materials used), or a reduction in the thickness of the stock possible to cut. The size of the drive pulley on the counter shaft (X, Plate C), is determined by the speed of the motor, size of its pulleys, etc., and can easily be worked out by prospective builders of saws to meet the conditions found in their own shops.

Names and Parts of Circular Saw.

Plate B.

1. **Center of saw arbor.**
2. **Hinges.**
3. **Center of tightening bolt.**
4. **Center of counter shaft.**

Plate D.

1. **Sliding table.**
2. **Cut-off gauge.**
3. **Angle gauge.**
4. **Saw throat.**
5. **Saw table.**
6. **Ripping fence.**
7. **Ripping fence guide.**
8. **Table elevator arm.**

Materials for Building Circular Saw.

4 pieces 4x4x36 pine—16 feet BM @ $100.00	$1.60
5 pieces 1½x8x33 pine—20 feet BM @ $75.00	1.50
2 pieces 1½x8x27 pine—14 feet BM @ $75.00	1.05
2 pieces 1½x4x27 pine— 7 feet BM @ $75.00	.53
2 pieces 1½x2x16 pine—½ foot BM @ $75.00	.04
1 piece 1x34x36 pine— 9 feet BM @ $75.00	.67
2 pieces 1x4x24 oak—1⅓ feet BM @ $250.00	
2 pieces 1x2x36 oak—1 foot BM @ $250.00	
2 pieces 1x1x18 oak— ⅓ foot BM @ $250.00	.83
1 piece 1x2x18 oak— ⅙ foot BM @ $250.00	
4 lag screws ¼"x3"	.08
4 lag screws ⅜"x6"	.10
4 R. H. screws 3"	.05
1 pair heavy hinges	.50
1 pair light hinges	.25
1 dozen RH screws 2½"	.15
1 saw arbor turned to details shown in Plate C at local garage	2.00
1 counter shaft turned to details shown in Plate C	2.00
3 pounds babbitt metal	1.50
Total cost of circular saw	$12.85

The Possibilities of Gesso for the Beginner

Ruth Elizabeth Chamberlin

GESSO work is modeling in low relief with a brush, the medium that is used being in liquid form. The method is not difficult and the expense depends upon the ambition of the worker.

Wood is the usual foundation, and boxes and other novelties manufactured for burnt woodwork are excellent and inexpensive. Frames, such as are used for carved gilded frames, are also good, but less expensive than these are the frames often found in the ten-cent stores. At home, one often finds odd boxes, or wooden containers, that can be pressed into service very successfully.

When you have decided upon the object that you wish to gesso, the next step is of course the design. For gesso, a fairly fine design is best, especially for a beginner.

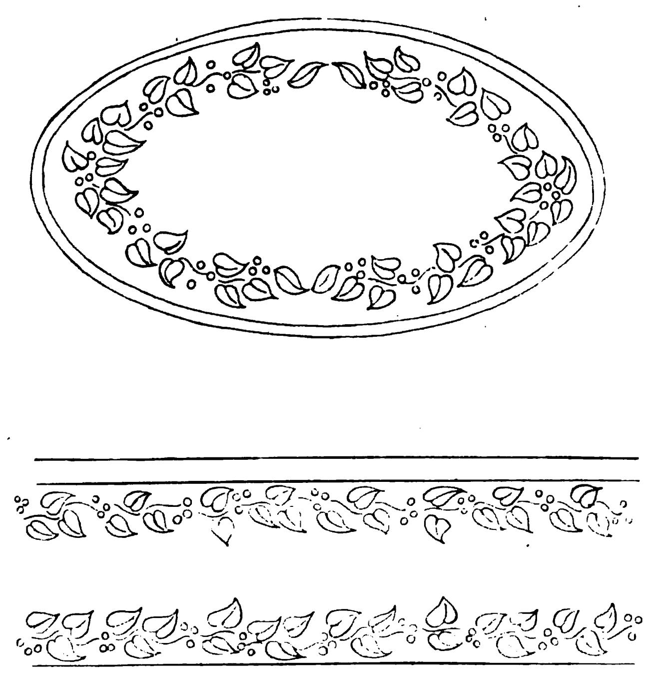


FIG. 1.

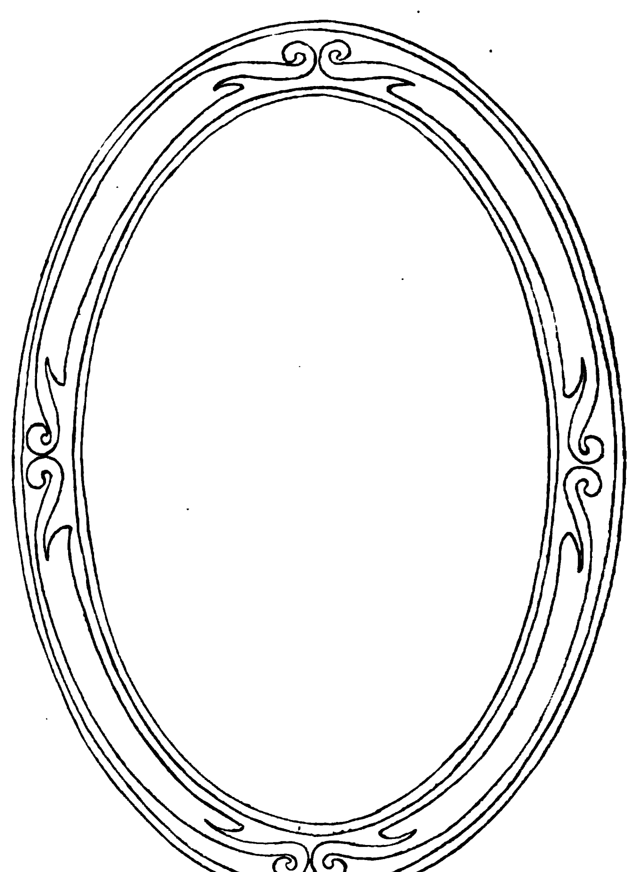


FIG. 3.

FIG. 2

For this kind of work, avoid excessive use of carbon paper. Tracing paper with the opposite side lined in with pencil, is much more successful. If the wood is stained black or a dark shade, the transferring is an easy matter if you chalk the back of your design instead of lining it in with pencil. To keep the design from rubbing, very carefully go over the lines with Chinese white watercolor paints. This holds the design and does not affect the medium.

The medium to be used is made in the following proportion. One part powdered resin, four parts linseed oil, and six parts glue. Sheet glue is the best to use, but it must be soaked in water over night, drained, and melted over hot water, before being added to the mixture. Mix the resin, glue and linseed oil. Next, mix some bolted whiting with some cold water and let it settle. Turn off the water and add the whiting to the first mixture. The amount of whiting added, should be enough to make a medium thick paste. Cook this mixture over hot water, double boiler style, until it is like custard. When using this medium, keep it over hot water so as to keep it in better working condition. When it becomes cool it thickens and does not flow from the brush easily. A small amount is better for the individual worker, and the following rule makes one jelly glass full. Four teaspoonsful of linseed oil, six of glue, and one of resin. Proceed in the same way as for the large amount.

The modeling is done with a camel's hair brush. As gesso should be textureless when finished, try to keep it so as you go along. Do not be impatient and try to put too much on at once. It is a temptation you will find, but refrain, for it makes the work granular and shows brush marks which is just what you don't want. "Blob" on the mixture and leave it. If you find when it is dry, that it is not high enough, just repeat. If any bubbles appear, which they often do, prick them with a pin and they will disappear. Sometimes the work is nearly dry before they show up, and if they do not fill up after they are pricked, drop a little of the mixture into the hole from the point of the brush. Don't be afraid of this work, for if it does not go on well, simply rub it off and begin all over again. The wooden foundation is strong enough to warrant this. Even after it has hardened it is not hopeless, for you can sandpaper the modeling down to the design.

After the modeling is thoroughly dry you can paint over it. If the box is stained dark, gilding the design is often effective, especially if it is toned to harmonize with the wood. In gilding, use that which is mixed with banana oil. The kind that has to be heated melts the medium used and you lose your modeling.

Oil paints are used for coloring in the design. Mix the color so that it will flow on easily, keeping the work flat. The depressions will form interesting shadows, and high lights may be made by wiping with a soft cloth. Don't fuss too much with your paint for it will often settle with more pleasing effects if left alone.

Number one is a design for an oval box which was stained, and the design gilded and toned to harmonize with the box.

Number two is another box which was stained black. The motives on the sides and top were done in soft green, while the dragon was in a soft gold.

Number three is a design for a picture frame which at a distance, resembles the carved gilded frames.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

WHAT VOCATIONAL TRAINING MAY MEAN.

One of the most wholesome symptoms noted in the American schools of today is the constant progress being made in vocational training. Everywhere there is manifested an increased interest and activity in preparing the youth for the more practical concerns of life.

While it is conceded that more vocations make for less enforced vacation there is a larger aspect to this tendency which deserves the attention of all thoughtful men. Much is being said these days about the re-alignment in world markets and the part the United States will play in the international trade relations of the future.

Those who are familiar with America's participation in the world trade of the past know that its raw materials have constituted the bulk of its exports. These materials, with the exception of food products, were exported to Europe, manufactured there into the finished article and in considerable part bought back by the American people. The increment of labor remained in Europe.

The country's exports on manufactured articles, involving a high order of mechanical skill, and the element of science, have always been at a minimum. But, the balance of trade was yearly in our favor, and therefore we were satisfied.

With the new order of things brought about by the world war the United States must strengthen its production efficiency. The countries of Europe, exhausted by the ravages of the war, will recoup themselves by producing more skillfully, more economically and more expeditiously than they ever have before. They are primarily industrial, buying their raw materials from all parts of the world, preparing them for ultimate use, and selling the finished product to the four ends of the world. They will require our raw materials, and it will require no salesmanship to sell them.

But, the products of the American factory, as well as the products of farm and forest and mine, must have an outlet beyond domestic demands. The output going into export may, under normal conditions, constitute the margin between prosperity and depression.

All this means that the American manufacturer must compete with the most energetic producers of the world. It means that the highest order of mechanical skill must find its way into our workshops, and that inventive genius, the economies of quantity production, and marketing ability must come into active and forceful play.

The trained mechanic will become the most important factor in the new order of competitive production. The American manufacturer has realized that the young man who has gone through a trade or vocational school comes to him equipped with the right attitude towards his task, with an appreciation of the dignity which attends a skilful, industrial and efficient mechanic, and with an ambition to render a square day's work for a fair day's pay.

The tendency, therefore, in the schools of the country to emphasize mechanical skill and excellence is a laudable one and will demonstrate its value and utility when the competitive phases of a world market come into clearer relief. The mission of the schools must be to teach the youth how to live, but also how to earn a living. If the American people are to be profitably employed and to remain uniformly prosperous, the increment of labor, on all articles that can advantageously be produced here, must remain within their keeping.

The schools may well shape their activities in order to promote and protect American industry in its efforts to hold its place in the markets of the world, and thus protect the wellbeing of an entire people.

SERVICE AND REWARD.

Now is the time of all times to press the supreme importance and value of *service*. We are passing through trying times. The principles of merit and service as against forcible demand are being fought out as never before.

The important lesson to be pressed home is that one's value and one's deserts are conditioned upon the *contribution which one makes in real service.* When one has rendered the real service, it naturally follows that one is entitled to the reward.

The danger and trouble have arisen from the fact that a great many people have been concerned with securing the reward without great attention to the rendering of effective service.

Teachers can wield a great and needed influence by reasoning out with their pupils the interdependence of service and reward. Perhaps no great service could be rendered by teachers just at this time.

DANGERS AHEAD.

The general business depression and unemployment are going to be taken advantage of by the reactionary forces in education to ask for a return to the good old times of the three R's. To be sure the argument will not be made outright against vocational education and industrial arts work, but the cry of economy, high taxes, and unemployment will be raised to close every school shop possible. There are those who have maintained an attitude of sufferance and tolerance toward these now forms of education. These forms of work have established for themselves a rightful place in the curriculum of our public schools. Hence, the only way that they can be attacked with any sort of success is by the indirect method of retrenchment.

If retrenchment must come let it come to all alike. Let it not pick out as its target the industrial phases of education. These phases are vital, the need for them is very great, and the vocational aspects of the work cannot be delayed. The boys and girls in need of vocational education cannot wait for readjustments and recovery from depression. *They must have their assistance now or it will come too late.*

There are numerous activities that have found their way into the schools that are in no way comparable in value and in pressing need to the activities in industrial and vocational education.

Let every friend of vocational education, industrial arts and continuation or part-time work be found constantly and with one accord opposing those reactionary forces that would eliminate these lines of work on the spacious and false plea of economy.

ALTERATION AND REVISION.

The new year is just opening. Teachers are faced with the necessity of preparing new outlines, problems, etc., or of using the old ones again. This is a serious matter. A good many teachers are content to use the same material, methods, outlines, etc., from year to year with no appreciable change.

We do not see how progress can be made in this way. Old plans, like old clothes, need frequent renovation and patching. In due time they need to be discarded, thrown away, and replaced by new articles better adapted to the needs and purposes of the times.

There is no more encouraging sign than the revising of courses, outlines, etc., and the teacher who is frequently engaged in such revision and remodeling has all the presumption in his favor of being an up-to-date, efficient teacher.

Everything now points to changes. New needs have arisen, new points of view have been acquired, and new demands have been made by the market conditions and the general financial situation.

Now is a good time to revise, to eliminate the worn out and useless, and to plan a more effective and less wasteful program.

THE MEASURE OF TEACHER

It seems absolutely necessary for teachers constantly to remind themselves that the most important thing in all the world, so far as the schools are concerned, is the matter of highly superior instruction.

What the teacher knows, or what the teacher is able to do, or what theories of education the teacher holds, all amount to very little, unless the teacher is really able to *put across* the knowledge, the ability, and the theories to the classes which are being taught. What takes place in the mind and life of the individual pupil as the result of instruction is the measure of a teacher's skill and worth.

IS TEACHING NARROW?

I heard a superintendent of schools say not long ago that teachers are narrow. This is a statement that I cannot force myself to accept. On the contrary, I believe teachers are broader-minded and more universal in their thinking and knowledge than are any other class. Comparisons are unpopular, I know, but are nevertheless necessary. Let us consider lawyers. Their training in all subjects except their major is decidedly elementary; of the law they know court procedure and where information wanted may be found. They read the daily papers, and profess a rather intense interest in practical politics. How is it with the bankers? They have picked up some knowledge of finance from their apprenticeship, can read an ordinary financial statement, and understand what constitutes simple credits. Their learning is neither profound, nor comprehensive; and their business judgment is not always infallible. To get an intelligent and interesting conversation out of the usual type you must talk about his own specialty, or perhaps a timid venture into the fields of sport or party politics is admissible.

Thus with other trades and professions. But note that all topics and all interests cluster around his business, and the sports in which he is proficient. He feels no compunction about talking shop, for shop is practically all he knows.

Now a teacher is first required to give proof of both general and special training, and further to back that up by satisfactory performance. She teaches not one thing but many; she uses knowledge drawn from all sources. She probably knows more about practical farming than the farmer, and could match the physician pretty well in the field of sanitary engineering. Then she knows human life and human living. The purpose of her work is not to advance her own interests, but to help others—individually and collectively. There is more variety in her duties than is found in selling groceries or computing interest. The teacher is not narrow, nor is teaching a narrow profession. Outsiders do not commonly regard the profession as narrow; most of the criticisms come from teachers themselves. The degree of perfection expected by these does themselves, and all, credit for modesty, but is there not a limit to which even this can be justified? A little more respect for ourselves will not do any harm. If there is any truth at all in the new psychology, the narrowest persons on earth are those who think themselves so.—*John C. Almack.*

Labor needs a few headaches to understand capital, and capital a few backaches to understand labor, while reform needs to get its hair cut to understand either.—*Irving T. Bush.*

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

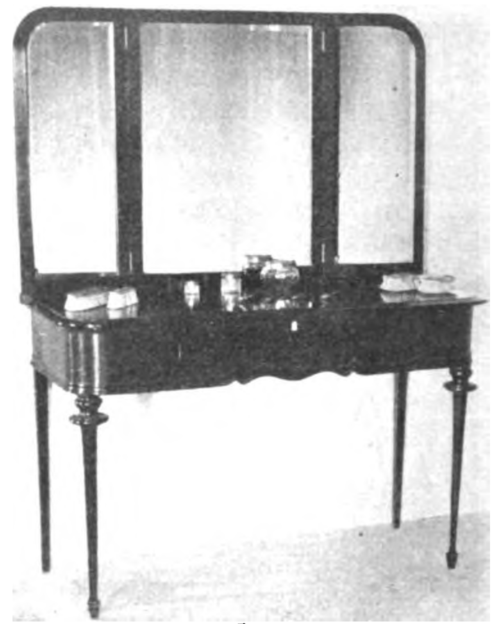
Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

DRESSING TABLE.

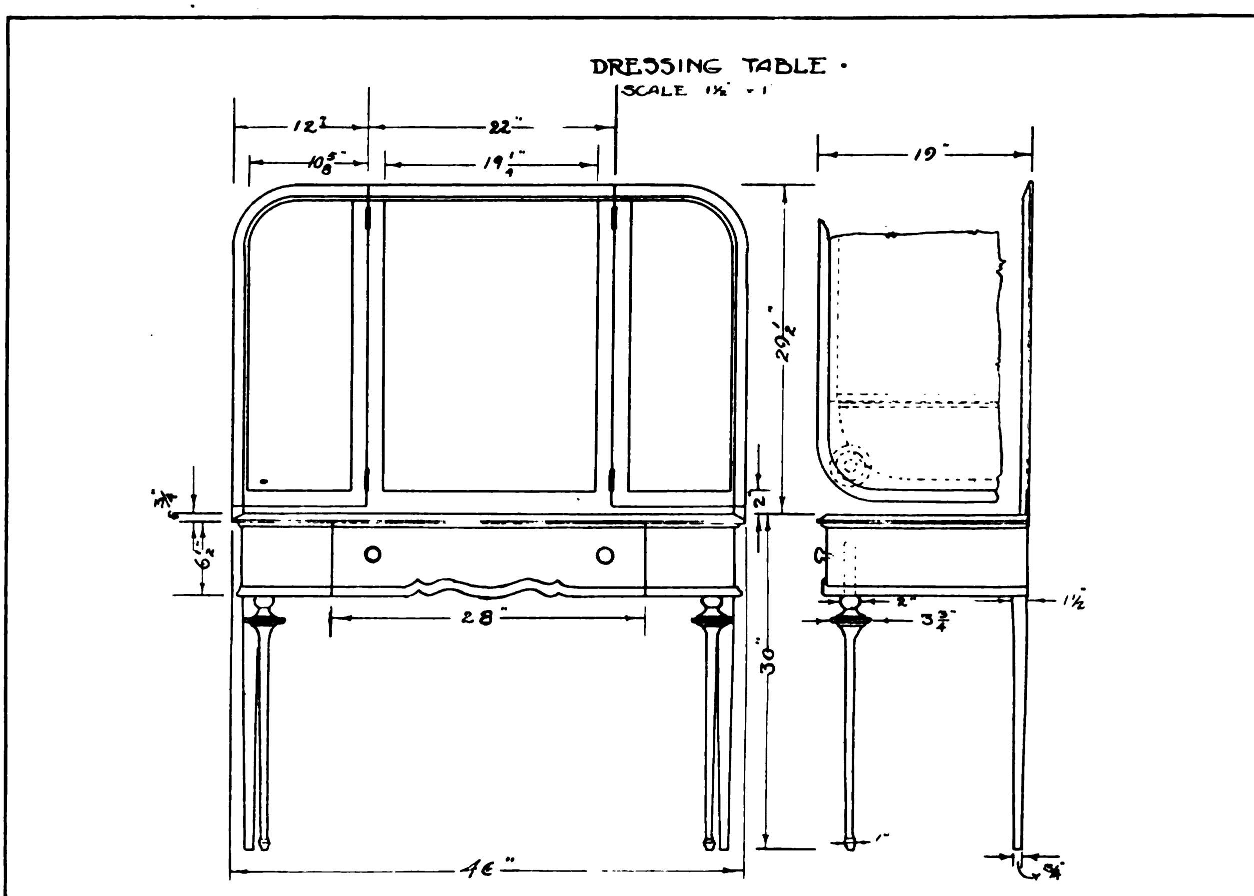
Howard R. Porter, Ellensburg, Wash.

The accompanying photograph pictures a toilet table, interesting not from any particular feature of design but from the fact that it was made out of an old piano. The piano involved was an old square concert grand whose "insides" had been damaged beyond repair. It had stood in disuse for several years and when even the junk man had refused to give ten dollars for it, it was turned over to the manual training department to salvage what was possible out of the wreck.

The ivory and ebony keys have proved very acceptable as inlay material while the wires, screws, brass pins, etc., have served a multitude of purposes. The most interesting possibility however was discovered when the solid body or bed was cut in two. The end with its two round corners suggested material for a writing desk or toilet table, and when cut in half proved to have the correct dimensions as far as width or depth was concerned. These two "ready made" ends were then properly spaced with side rails and the body of the table was formed. The flat round cornered top proved the right material for the top of the table and its shaped edge gave a factory finished effect. Then the shaped moulding was stripped from various parts of the piano and reglued around the upper



DRESSING TABLE.



DETAILS OF DRESSING TABLE.

and lower edges of the table, the curved segments just fitting the round corners, with a specially shaped piece serving to enhance the lower edge of the drawer front.

Perhaps the most satisfactory adaptation in the whole piece was that of making the mirror frames from portions of the piano top. The curved corners were simply cut out to form the swinging mirror frames, thus allowing the shaped edge to run around the entire set of mirrors. The material removed from the center of the side mirror frames was not wasted but worked up nicely into picture molding. The center frame was made of strips cut from other parts of the piano top.

The only parts of the table that the piano did not supply were the legs and these were made of walnut, finished to match the other material which was rosewood. The entire piece, after the old varnish was removed, was left the natural rosewood color, and French polished.

While not everyone will have an old piano available for transmuting into a toilet table, the design is not difficult and could be reproduced in the average shop, the rounded corners presenting the chief problem. These can be easily built up, bandsawn and veneered.

NECKTIE HOLDER.

A. R. Mitchell, Madison, Wis.

No doubt, the average teacher of manual training, has been confronted with the problem of providing a project for upper grade classes which involves extremely accurate workmanship and very little material. This latter feature is surely one to be reckoned with, during these days of high prices.

This necktie holder is one which the writer has found to be a great favorite with eighth grade boys, since it is something that they can use, and is both ornamental and practical. The making of the working drawing provides a very good problem, particularly for projection work.

The top frieze can be attached to the back with either 1" brads or oval-head screws, while the two end pieces can be attached by means of either ½" brads, oval head screws, or flat head screws, inserted from the back. The holder may be hung in several different ways—small holes may be bored through the overhang of the top frieze and ribbon or cord inserted, or small strips, with holes for ribbon, may be fastened on the back side of the back piece. Screw eyes may also be used.

Bill of Material.

1 piece ½"x4¾"x16"—back.
2 pieces ½"x1¼"x9"—top frieze.
2 pieces ½"x1⅝"x6"—ends.
1 piece ½"x½"x15"—bar.

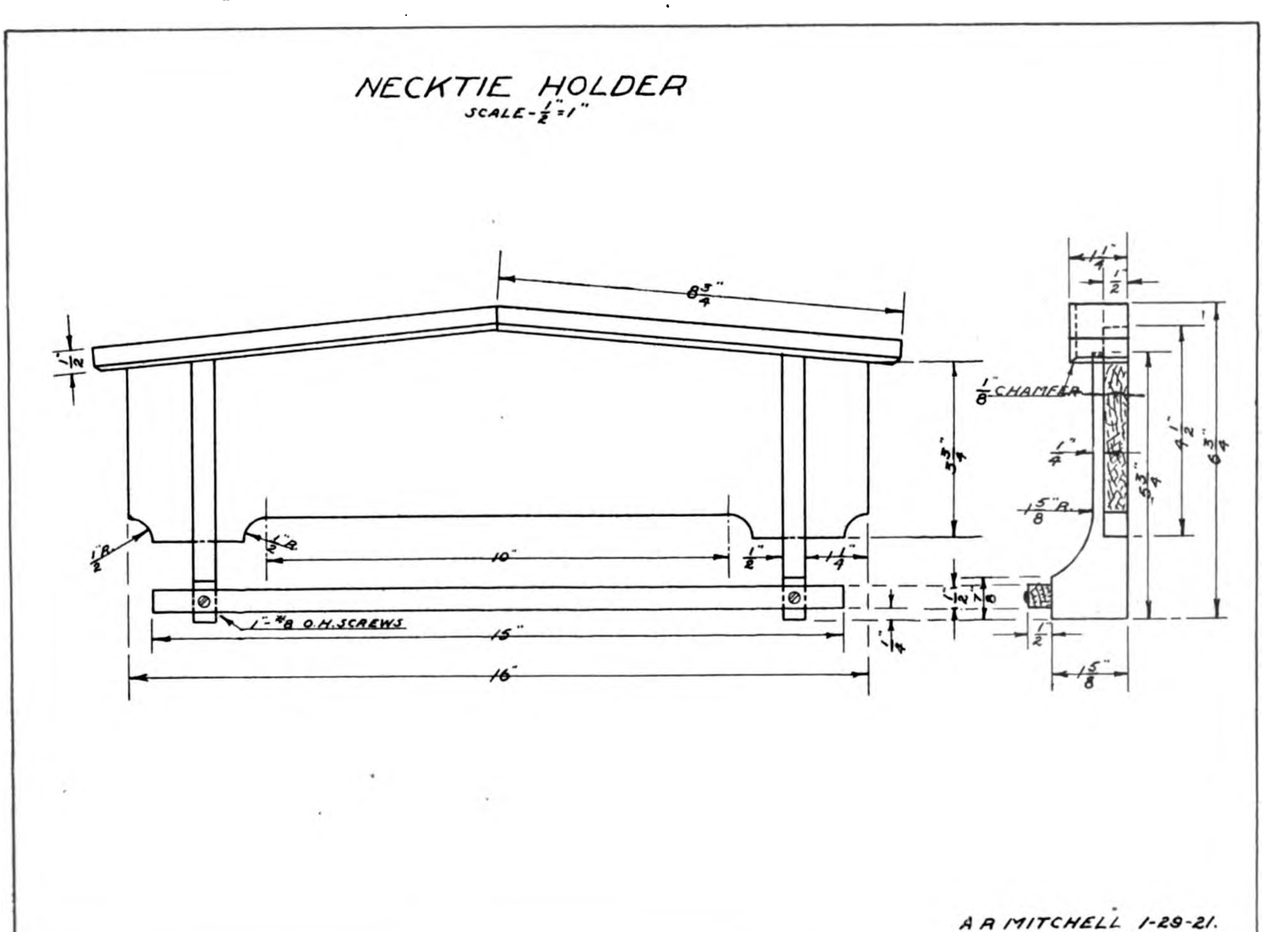
Black walnut, mahogany, gumwood, birch or oak may be used, and finished as desired.

INDOOR TARGET.

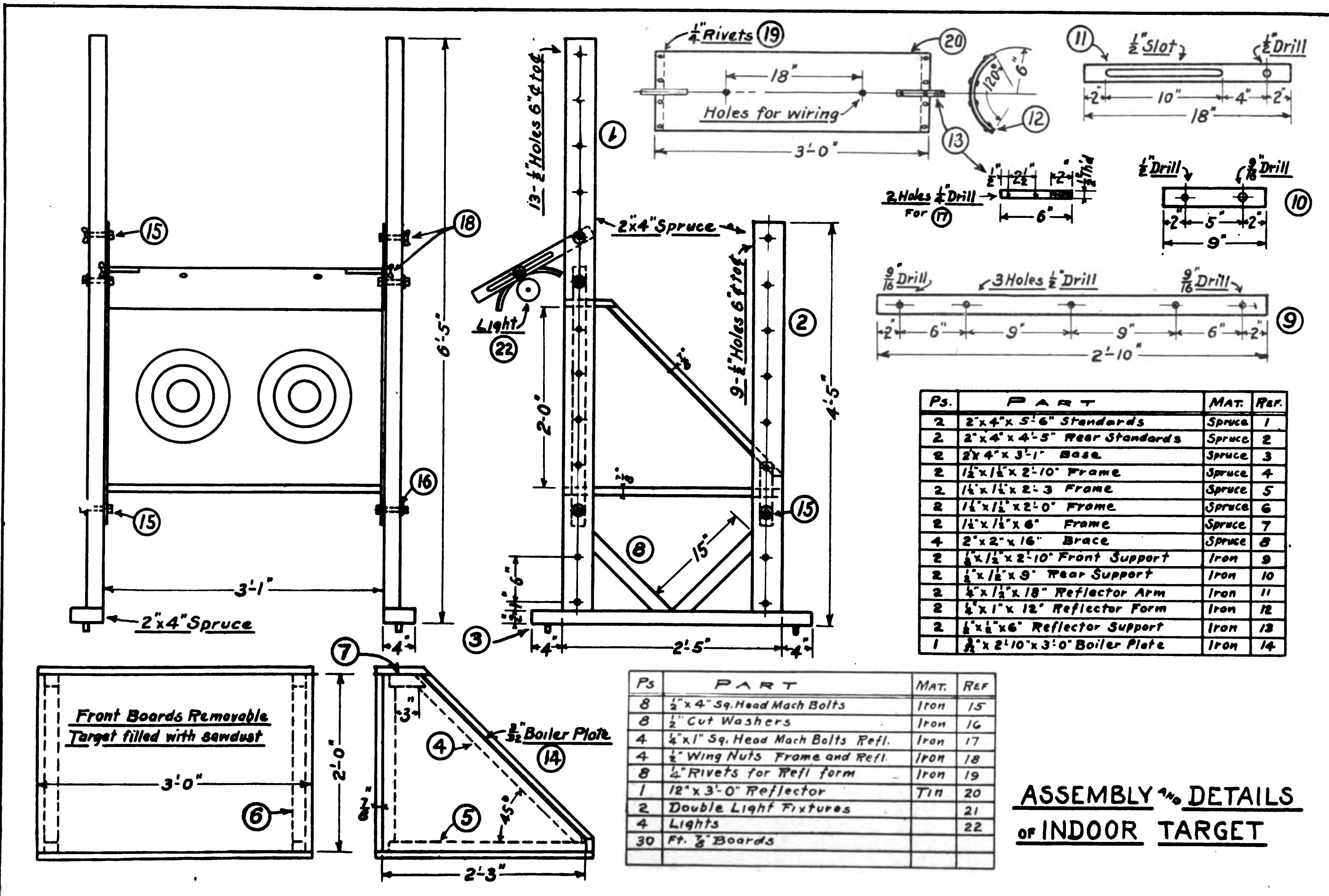
A. B. Hayes, Director of Mechanic Arts, Bangor, Maine.

For a long time officers connected with R. O. T. C. units in the various educational institutions have been hampered for a suitable target range. Very few schools have the room to build a special range, but nearly all of them have a room which could be used for a range part of the time but which would not be suitable for erecting a permanent target. If a target could be made which would be adjustable, and at the same time could be taken down and stored away in some out of the way corner, the problem would be solved.

These conditions existed in the Bangor high school which like every high school in the country can hardly accommodate the various classes, let alone the target work. On his assignment to Bangor Lt. Col. Casper W. Cole started to overcome this handicap and with the assistance



DETAILS OF NECKTIE HOLDER.



Ps.	Part	Mat.	Ref.
2	2"x4"x 5'-6" Standards	Spruce	1
2	2"x4"x 4'-5" Rear Standards	Spruce	2
2	2"x4"x 3'-1" Base	Spruce	3
2	1 1/2"x1 1/2"x 2'-10" Frame	Spruce	4
2	1 1/2"x1 1/2"x 2'-3 Frame	Spruce	5
2	1 1/2"x1 1/2"x 2'-0" Frame	Spruce	6
2	1 1/2"x1 1/2"x 6" Frame	Spruce	7
4	2"x2"x 16" Brace	Spruce	8
2	1/4"x1 1/2"x 2'-10" Front Support	Iron	9
2	1/4"x1 1/2"x 9" Rear Support	Iron	10
2	1/4"x1/2"x 18" Reflector Arm	Iron	11
2	1/4"x1"x 12" Reflector Form	Iron	12
2	1/4"x1/2"x6" Reflector Support	Iron	13
1	3/32"x 2'-10"x 3'-0" Boiler Plate	Iron	14

Ps	Part	Mat.	Ref
8	1/2"x 4" Sq. Head Mach Bolts	Iron	15
8	1/2" Cut Washers	Iron	16
4	1/4"x1" Sq. Head Mach Bolts Refl.	Iron	17
4	1/2" Wing Nuts Frame and Refl.	Iron	18
8	1/4" Rivets for Refl form	Iron	19
1	12"x 3'-0" Reflector	Tin	20
2	Double Light Fixtures		21
4	Lights		22
30	Ft. 7/8" Boards		

ASSEMBLY AND DETAILS OF INDOOR TARGET

of the mechanic-arts department has developed a target which should be adaptable for any indoor range.

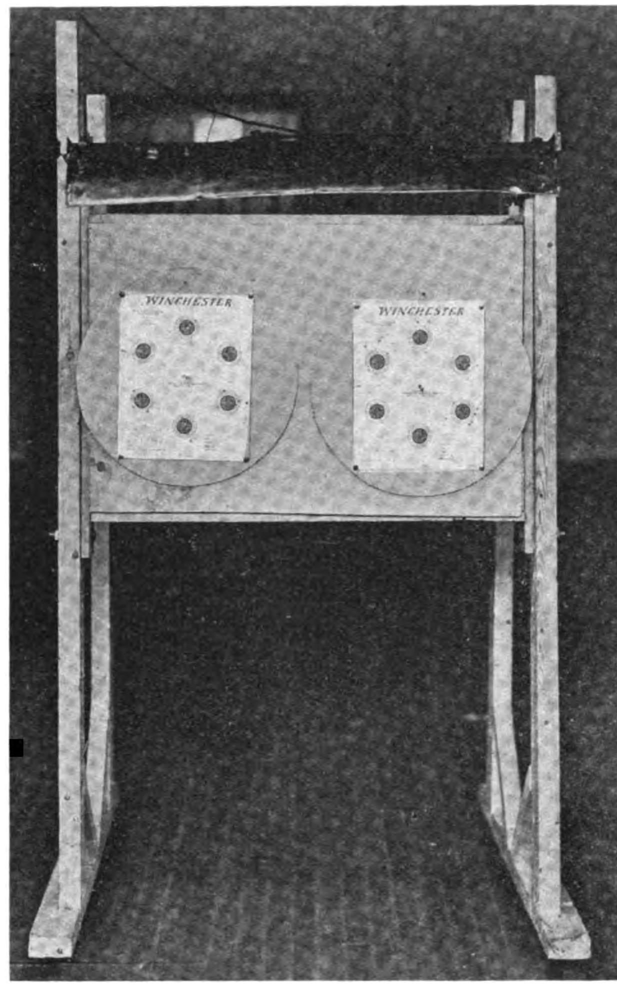
The target proper consists of a box made of spruce boards over a 1½"x1½" frame. The back of this box is set at an angle of 45°, and lined with a piece of 3/32" boiler plate to stop any bullets which might go through to the back. The boards on the front of the box are screwed on and are replaced when they become too badly shot to pieces. The box is filled with sawdust and shavings to stop the bullets.

The target is mounted on frame supports which bolt to standards. These supports are made of ½"x1½" iron and are screwed to the target. The standards are of 2"x4" spruce with 9/16" holes bored every 6" so that the target may be adjusted to any possible shooting position. The standards are also equipped with casters so that the target may be moved around.

The light is provided by four incandescent lamps with a tin reflector. This reflector is equipped with arms which fasten to the standards and which reflect the light as may be desired.

The target was made by mechanic-arts department in the high school and has been in use since early in December, 1920. It has proven to be a wonderful arrangement and the men are enthusiastic in their praise.

Schools which are pressed for room will be particularly interested in this new target as it can be set up anywhere. All that is needed is the required 50 ft. or 75 ft. from the marksman to the target. Plans and specifications have gone on to the War Department.



THE TARGET READY FOR USE.

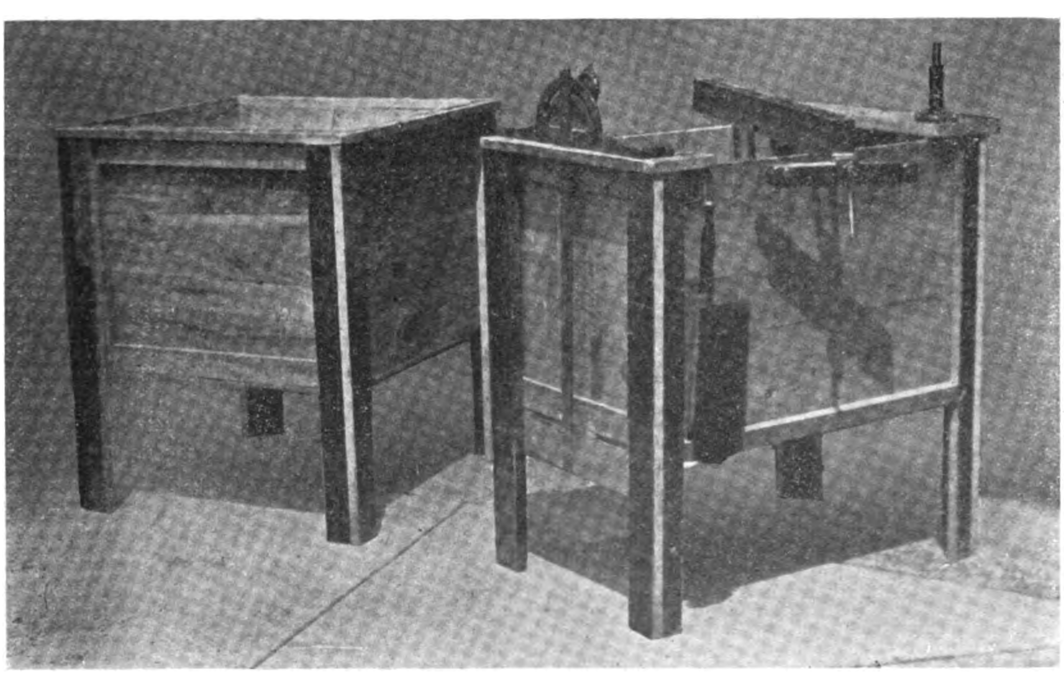
SCRAP BOXES FOR WOOD.

William V. Winslow.

Crowded conditions and poor lighting which are so often met with make the boxes illustrated especially serviceable, for in addition to their use for storing odd pieces of wood they can be arranged to support boards and in this way serve as a table upon which to stain, to assemble parts, do concrete or other industrial arts work. A permanent top can be constructed and when not in use can be put against the wall out of the way. Of course the boxes can be used singly in which case separate tops must be supplied.

At the North Tonawanda high school we use the larger box in the bench work shop and the smaller one in the machine woodworking room.

The smaller box is placed just to the right of the circular saw where it does not interfere with the tilting of the saw table. As shown in the illustration it furnishes a support for the fence or the gauge from the table when these are not in use.



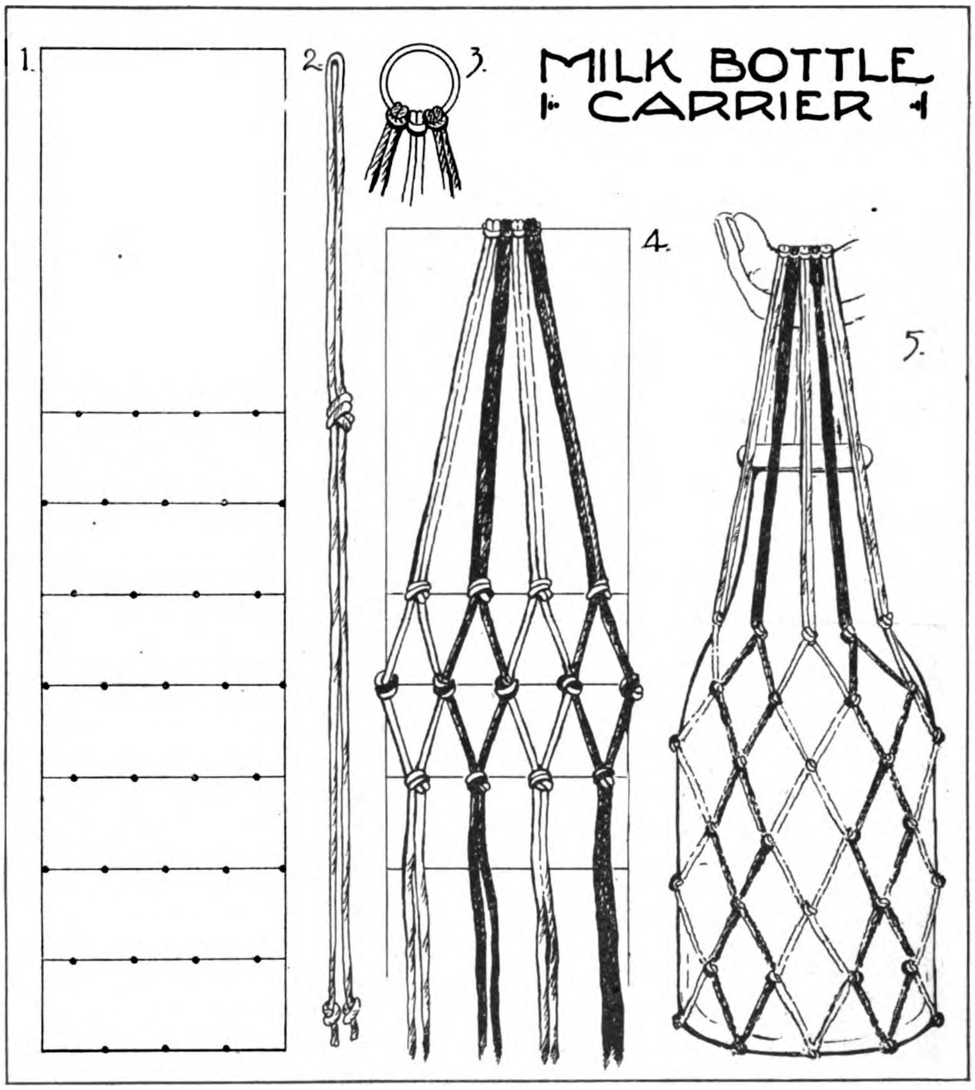
SCRAP BOXES MADE AT THE NORTH TONAWANDA HIGH SCHOOL.

A MILK BOTTLE CARRIER.

C. Edward Newell, Springfield, Mass.

Out of the slogan "be patriotic, carry your own packages" has grown the very universal custom of carrying many articles formerly delivered free of charge. One of the most awkward of these packages is the milk bottle. Especially is it at the peril of its existence if entrusted to a small child and when it is the one last package added to the already too numerous load carried by an adult. The macrame bag or milk bottle carrier will save many a crash and is so compact that when not in use it can be carried in a coat pocket or purse.

The Loom: On the 4"x16½" pulpboard draw one 4" line 6" from and parallel to one 4" end. Between this line and the opposite end of the card draw six 4" lines 1½" apart. Repeat all lines on the opposite side of the card. On the first 4" line, the one 6" from the end of the card, place points ½" from the ends of the line. Between these points place two points 1" apart. Punch holes through the card at these four points. On the second line place three points 1" apart, also points at the ends of the line. Place points on the third line, fifth line, seventh line, like the first line points. Place points on the fourth and sixth



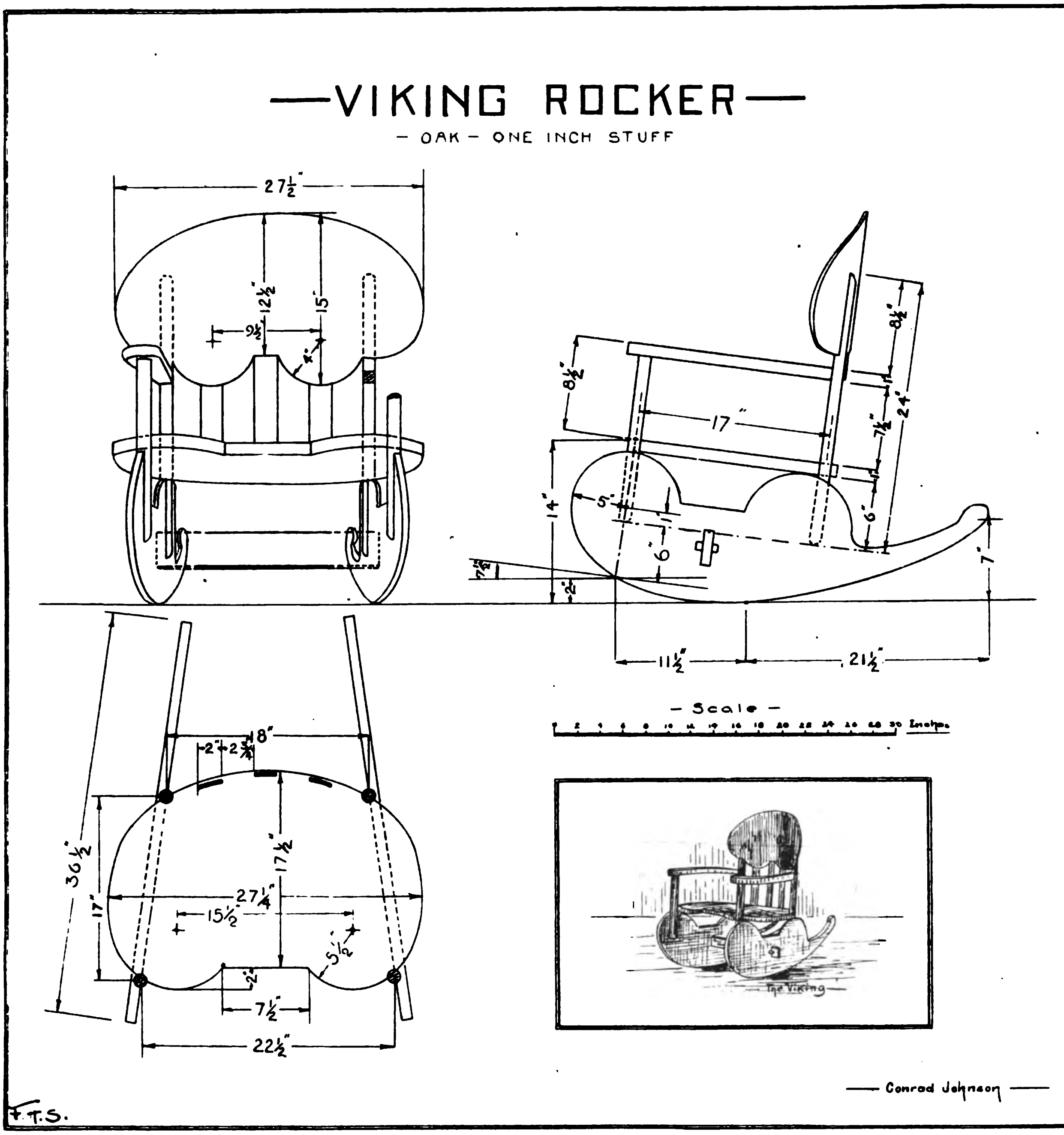
DETAILS OF LOOM AND MILK CARRIER.

The materials needed for the bag are: one piece of pulpboard 4"x16½"; one ½" or ⅜" brass drapery ring; one ounce of macrame cord of a light color; one ounce of a dark color; two feet of common white string.

Any medium weight cardboard from a discarded suit box will answer if the pulpboard is not available. Pulpboard can be purchased at the bookbinders and at paper houses in sheets some 2'x3" in size and in bundles of 50 sheets. The drapery rings may be purchased by the dozen in the drapery department of a dry goods store or at a ten cent store. The macrame cord is a standard weaving material carried by school supply and paper houses. The size 12 cord comes in a variety of colors having about a half-pound in a ball. Two colors should be selected or light and dark values of one color. Four pounds, two of each will supply a class of 45 pupils.

lines and the lower edge of the card like the second line points, Fig. 1. Repeat all points on the opposite side of the loom. Accent all points with brilliant crayon or color spots.

Prepare Macrame Cord: Measure and cut four 6" pieces of white string. Measure and cut four 1½ yard pieces of macrame cord of dark color. Measure and cut the same amount of light color macrame. Tie hard knots close to the ends of each cord as fast as cut to prevent raveling. Double each cord, tie hard knots 6" from loops, Fig. 2. Hook the cords over ½" drapery ring, alternating colors, Fig. 3. Place the ring over the end of the card or loom, four double cords of each color on each side of the card. Fasten the cords to the card by means of the 6" white strings, looped and tied through the holes in the first line. A dark macrame knot will be on one side of



DETALS OF VIKING ROCKER.

the card, tied by means of the white string through one hole, to a light macrame knot on the opposite side of the card and so on alternating the colors on opposite sides of the card.

Weave the Bag: The card with the lines drawn on it makes a loom upon which to weave, by knotting or tying the bag. Begin to tie the knots at the second line using a light and a dark cord; the crayon accented points serve as guides for knots. Tie a single hard knot at each point. Work completely around the loom. At the line end, one cord from each side of the loom will be knotted, Fig. 4. At the third, fifth and seventh lines tie cords of the same color. At the fourth, and the sixth lines and at the lower edge of the loom tie cords of two colors, or light and dark cords. Cut a 16" piece of macrame to run through the last row of meshes, above the last row of knots. Run this cord through the meshes twice and securely tie the ends using a square knot. The opening at the bottom of the bag should be about 1½". Cut off all cords 1½" below the last row of two color knots. Cut away the white strings and remove the bag from the loom by bending the card and slipping it out of the bag at the top. A milk bottle can be slipped into the bag at any one of the eight openings between the double cords.

Doing It for the Boy.

Some teachers do not allow boys to find out things for themselves. They "skin the banana" mentioned in the following:

A little girl had received a banana from the grocer and had accepted it silently.

"What do you say to the kind man?" asked her mother. "Please skin it" replied the child.

If we want knowledge, we know we must conquer ignorance, so when we want light we conquer darkness, and when we come to want success, we know we have but to conquer a faint heart.—*Lloyd.*

A MECHANIC-ARTS BUILDING.

New Mechanic-Arts Building, South Cache High School, Hyrum, Utah.

E. Perry Van Leuven, Head of Department of Manual Arts.

In the design of a shop building for a rural school many things must be considered. The building must be such as to accommodate courses in manual training demanded by the particular district it is to serve. The type of agriculture the community is engaged in must be met with adequate manual training. The mechanical problems of a dry farm are far different from those of a fruit farm, and the manual training offered to the students should attempt to solve a majority of these problems.

Most rural schools are not large enough to need a separate shop for each branch of mechanics for the entire school year. Many courses can and should be given in each shop room at a different time. Probably the entire course in mechanics will be taught by not more than two or three instructors. These few men will teach at least six or eight different branches of mechanics, hence courses can not run continuously. The entire class must change from one branch to another, all at the same time. It is surely a poor policy to divide a shop building into a number of small shops, each for a specific type of mechanics when that type will only be given a few months at most.

I am of the opinion that the courses should be well outlined so that the building can be planned to accommodate the work desired, and unless the school is a trade school, in which it is known that the different departments of trade training will run continuously, that the shop should have only a few large shops for practice and the necessary tool rooms and store rooms.

One of the points that has come to my notice in shop buildings is a lack of tool rooms, store rooms, etc. The absence of these rooms is a detriment to an efficient shop. Small rooms are far superior to cages and cupboards to house the general equipment of the shop. In a shop where a stock of materials must be carried, store rooms are an absolute necessity. Not only is the appearance of the shop improved but the commercial-shop atmosphere is introduced.

A paint room is a fundamental addition. Paint and varnish jobs must be removed from the shop dust and it is highly desirable that the paint room have an even temperature. In particular is this true in the repainting of an automobile. In the building design the paint room should have north light.

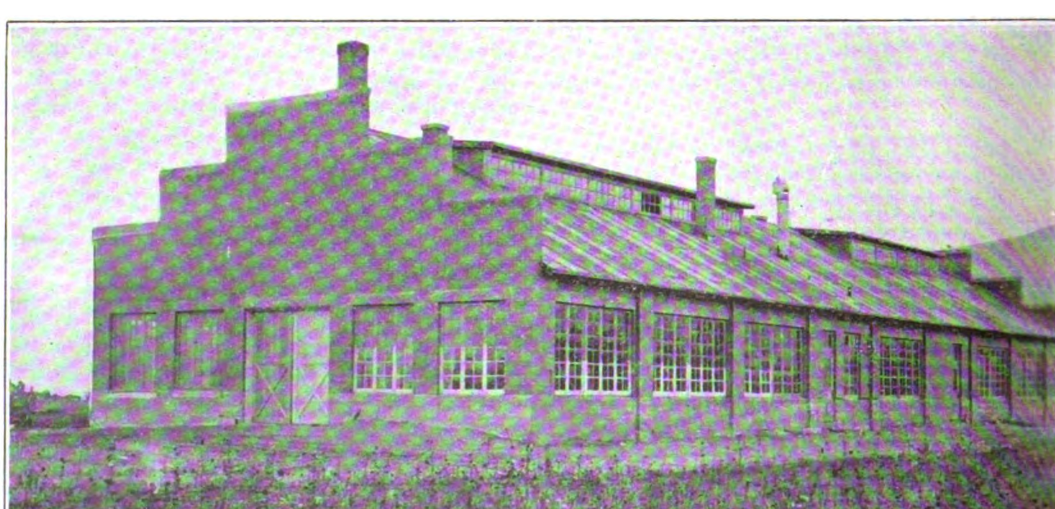
It is my shop experience that a class cannot be kept together in their advancement. It is useless to give a demonstration to a boy until he is ready to do the job. In an average class about three demonstrations are usually necessary to take care of the slow, the medium and the fast students. If this is the case it is impossible to conduct a class recitation in the shop itself. The necessity of a classroom is evident. If a classroom is provided with a demonstration bench, classes can be held for a few students, without taking all from their jobs. I have visited shops where instructors have all boys (no matter at what stage of advancement) stop working, gather around a bench and stand up the entire period, no less than three times, for a demonstration on the same project simply because the class could not be kept together and because a class recitation was impossible with boys working at their bench or machine.

It would undoubtedly be a good policy if the head of the shop department could cooperate with the architect in the design of the shop building, to properly utilize it to its maximum capacity. In this shop building the writer designed and with the aid of Mr. H. R. Adams, principal of the school, supervised the construction of the building, at no time calling for the services of an outside architect. We made our own design, wrote the specifications, got out the working drawings and blue prints, submitted the design to the state architect for approval and finally erected the buildings, letting what sub-contracts we saw fit.

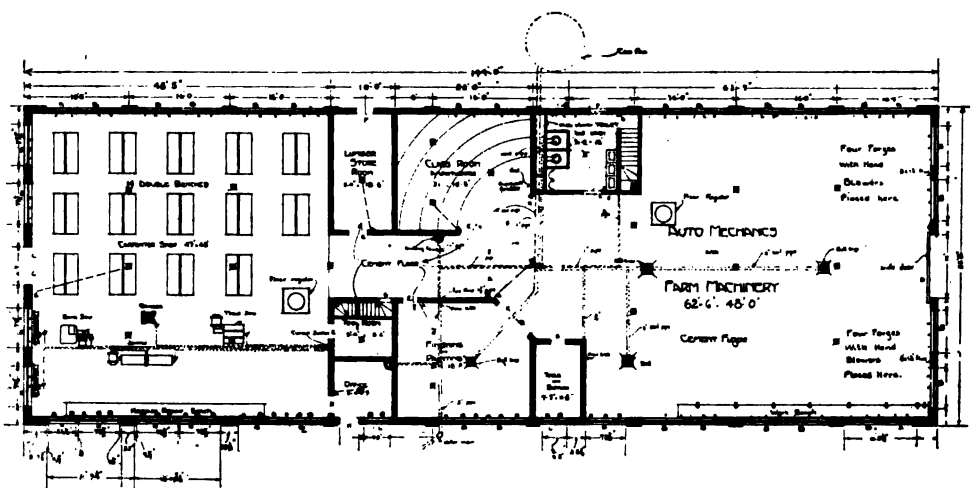
Not only did we save the board of education a considerable sum of money in architects' fees, for drawings and supervision; but the entire construction was thirty per cent below the lowest contractor's estimate. The construction was twenty per cent below the estimate made by the state architect. Wages were high; carpenters received $7 per day, brick layers were paid $10 and $11, tenders $6, plasterers $10, and common labor, $4.50 to $5.

The low cost was due, we believe, to close figuring in the purchase of material, to eliminating waste of time and material, and to favorable purchase and delivery of material. The building was completed sixty days after started, so it is evident that no time was lost during construction.

The illustrations explain the building completely. A few points of interest might be mentioned. The classroom is of amphitheatre type affording good view for all



GENERAL VIEW, MANUAL TRAINING BUILDING, SOUTH CACHE HIGH SCHOOL, HYRUM, UTAH.



FLOOR PLAN, MANUAL TRAINING BUILDING, SOUTH CACHE HIGH SCHOOL, HYRUM, UTAH.

students in class demonstration. This room is provided with an opening from the shop 7' x 8' in size, thus permitting the entrance of an entire machine for class study. The paint room on the opposite side of the building has a similar entrance allowing a large car or machine to be brought in for painting, washing or cleaning. These 7 by 8 foot doors are on an angle of 45 degrees permitting the machine to be placed anywhere in the room without backing or shifting.

The outside entrance of the farm machinery shop is ten feet square—large enough to admit a threshing machine for study or repair.

Each main shop has a maximum of light—that is, light from three sides and from the sky-light ventilators. With this construction it is impossible to cast a shadow on any bench or work—a very desirable condition in a shop.

The building is built of brick throughout, unplastered on the inside, except for the office and the ceilings of the classroom, paint room, toilet, and store rooms.

The roof is supported by queen rod trusses, sixteen feet on centers. The purlins, four feet on centers, are hung in stirrups and are flush with the surfaces of the trusses. There are no rafters. The sheathing is nailed directly to the purlins and trusses. The entire room is covered with five-ply tar and felt roofing. The under side of the sheathing is finished by paneling the purlins and trimming with a three inch bed mould. This open roof construction is neat and the expense of a ceiling is eliminated.

Each shop is provided with its own pipeless furnace. These furnaces take care of the heating very efficiently. A fire started one hour before school opens will raise the temperature from thirty degrees to seventy degrees. These two furnaces installed, cost only $600. The estimate for steam heat piped from the main building was $2,200 and I do not believe that the steam heat would be more efficient.

The floor in the carpenter shop and the office is wood, the remainder of the building has concrete floor. The truss roof gives the much desired clear floor space for shop purposes.

Electric wire conduits were placed beneath the floor in the carpenter shop eliminating overhead wiring for each individually driven machine.

Few changes have been made in the floor layout. In the carpenter shop the benches have been moved to the north side and the conduits have been installed on the south side. This was done for two reasons. The benches are used more than the machinery and are moved out of the sunlight. The machinery was moved closer to the lumber store room.

ART APPRECIATION.

Marie Carey Druse.

"The purpose of Art education," says Henry Turner Bailey, "is the development of appreciation for the beautiful and of the power to produce beautiful things." To the average person the first purpose seems the more important because it is something with which he is intimately concerned, whatever his business in life may be.

Art is not a thing, but rather a quality with which things are endowed, and the appreciation of that quality begins as soon as the individual makes a conscious choice between objects because one gives him more pleasure than another. Appreciation and enjoyment go hand in hand, and the problem of raising the standard of appreciation resolves itself into one of raising the standard of enjoyment.

To most of us art means a picture in a frame, a statute on a pedestal, a building whose columns are of Greek origin. We are apt to forget that everything that speaks to us through its color, its form, or its arrangement has or should have the quality of art inherent in itself, whether it be a sunset, a new dress, a page in a book, or the room in which we sleep. It is this wider interpretation of art that makes the development of a national art appreciation a paramount necessity. As a people, we have low standards of enjoyment, and this is reflected in the objects with which we surround ourselves. Manufacturers and merchants tell us that they make and sell goods the public will buy. The buyers say that they must purchase such articles as they find for sale. The remedy lies in the development of new and better standards of taste in the younger generation who in the tomorrows to come will be the manufacturers and merchants as well as the buying public. When they have once learned that any article may not only be useful, but beautiful as well, the supply and demand for such articles will follow.

Our work as teachers is to develop the talent we find in each child who comes under our care to such a degree that he will appreciate and enjoy only those things that are inherently useful and beautiful in his home, in his community and in his country.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finishing Gum and Cherry.

232. Q:—I have made a caned fernery of two kinds of wood—red gum and cherry. How should I stain it to get a dark brown color and have the two woods look alike? Is it advisable to stain the cane and varnish it, or leave it natural?—S. M. P.

A:—First sponge the wood with a solution of two ounces of tannic acid to a gallon of water. This when dry is to be sanded smooth and followed by a second coat of hot stain made from two ounces of sodium or potassium dischromate per gallon of hot water. The work should then be placed in a warm room in order that the color may fully develop from the atmosphere. The work may then be given a sizing coat of any good varnish and when dry sanded glass smooth. These varnish coats are to be repeated until the proper surface is obtained. Avoid the use of shellac on work of this type owing to the possibility of damage to the finish from moisture. If it is desired to stain the caned panel it is suggested that a coat of Japan gold size be carefully brushed on and allowed to dry. On this surface there may then be built a pleasing shade of color through the use of Japan to match the shade of the fernery. This method is virtually the production of a color glaze and while best done with an air brush, it may however be done quite as well through the use of considerable care and a soft fitch flowing brush which will prevent the lifting of the glazing color. This should be allowed to dry at least twenty-four hours and may then be given one or more coats of the varnish, care being taken to avoid undue brushing which would tend to soften and displace the glazing color on the cane work.—Ralph G. Waring.

Painting Exteriors.

234. Q:—I would like to obtain some information about paints. A house which had been painted a chocolate color has faded considerably in two months. The paint is dull and has no gloss. What will prevent fading and what can be done to obtain a gloss?—W. M. F.

A:—So many factors enter into this case that I am forced to simply enumerate several possibilities and the usual treatment. First, the house may have been in a neglected condition and the paint work practically "starved for oil" as it is termed in the painting trade. It will be readily seen that when a new coat of paint is applied that this porous under surface will very quickly absorb every particle of oil obtainable, thereby leaving the new coat in a dry and chalky condition. Another coat over this foundation will temporarily allay this condition, but it too will soon become dead and lifeless through loss of oil absorbed by the priming coat. This general condition of oil loss is responsible in the main for the socalled fading of brown shades. The loss of oil through absorption is often hastened by the use of too much turpentine in priming and finishing coats.

To inexperienced people a paint mixture having the proper oil body often seems too stiff and heavy for brushing and in order to avoid the elbow grease, which all first class paint work demands, the goods are thinned with turpentine. The only thing which is at all practicable in this case is to repaint one coat made up on the following formula:

100 lbs. white lead in oil,
20 lbs. burnt umber,
8 lbs. burnt sienna,
¼ lb. medium chrome yellow,
6 gals. raw linseed oil,
½ pt. dark japan drier.

This makes about eleven gallons of paint.

I believe it to be good practice to add a pint of spar varnish to each gallon of paint ready for the last coat work. I find this acts as a good re-enforcing vehicle and enables the oil to stand up better and to hold its gloss longer than would otherwise be possible. This, of course, infers the use of a high grade outside spar varnish such as, for example, is made by Pratt and Lambert or Keystone Varnish Company.

For some unknown reason the general opinion seems to prevail that anyone can paint a house. Perhaps anyone can paint a house but that is no guarantee that the surface has been properly prepared for the paint; that the paint itself is the proper mixture for the different sides of the house, since the north will always take more oil than the east, and the south a little stronger color than the west; that the proper kind of brush and sufficient brushing in an approved manner is being used—in other words, that the man on the job knows his business thoroughly. In no trade is experience and long practice quite so necessary as in the painting trade. For the amateur to attempt to do the work of a well trained man is often attended by great risks. For instance, I have heard people insist that any old thing is good enough for the priming coat and that yellow ochre is good enough. The result is that this coarse pigment does not attach itself well and thoroughly to the wood; worst of all, it absorbs moisture from the atmosphere during the process of drying the priming coat, and when covered with high grade finishing coats, never offers a foundation of any merit whatever. Hundreds of jobs where cracking and blistering have occurred in after years, and sometimes immediately after the work is done, can be attributed to this malpractice. It is the best of good economy to hire an experienced journeyman painter who takes pride in his work, and who is willing to offer accepted paint jobs which have stood the test of time, as recommendations.—Ralph G. Waring.

VOCATIONAL CONFERENCE AT STOUT INSTITUTE.

The vocational conference held during the month of August at Menomonie, Wis., aroused considerable interest not only because the program subjects and the speakers were well chosen, but also because both program and speakers revealed surprising strength.

"Educate the Whole Man" became the slogan when the first speaker, George Hambrecht, the new secretary of the State Board of Vocational Education, spoke. Mr. Hambrecht was for some years a member of the Wisconsin Industrial Commission in which capacity he had an oportunity of making observations in the industrial field not open to the average educator. He traced the relations between the school and factory and pictured the mission of the modern vocational school in training for self-assertive and self-sustaining citizenship.

That the vocational school is everyman's, was the burden of an address by John Callahan, the newly elected state superintendent of instruction of Wisconsin. He pointed out the difficulties in enforcing new school laws. The new law which raises the age limit from sixteen to eighteen must be understood by pupils and parents in order to render it wholly acceptable.

"Leadership in the continuation school is not going to be a job for a transformed manual training teacher" said E. A. Fitzpatrick, Secretary of the State Board of Education. "It is a job for a person sensitive to the new attitude in industrial relations, and implies a sense of duty alike to the pupil and the community."

Mrs. Glenn Turner made a plea for inspired teachers in citizenship and the humanities, while Lieutenant Governor Cummings looked to the schools to solve social problems. Among the speakers were also Tracy Cobb, A. R. Graham, Messrs. Faulkes, Gunn, Miss Johnson, supervisor of domestic science, E. W. Barnhart of the Federal Board of Vocational Education, L. P. Whitcomb, H. G. Stewart, L. A. Crocker, E. F. Randall, T. S. Reese, W. F. Rasche, R. L. Cooley, Regina Groves, Walter Simon and Joseph Brown.

A LIST OF LUMBER DEALERS WHO ARE WILLING TO SUPPLY MATERIALS TO MANUAL ARTS AND ENGINEERING SHOPS.

Compiled by Victor J. Smith, Professor of Manual Arts, State Normal School, Alpine, Tex.

Many instructors in our schools and colleges have experienced difficulty in securing the variety of hardwood lumber necessary to properly conduct classes in woodworking. Local yards are rarely able to solve the problem either in variety of woods or price. The following list of firms has, therefore, been compiled in order to enable such schools to get in touch with the larger lumber dealers in their neighborhood.

Each firm is listed by special permission and the general tone of the letters received in answer to our inquiry was one of friendliness to the school shop and a more than commercial interest in manual arts and engineering woodworking.

While local shipments have often delivered lumber cheaper than the prices at the smaller yards these shipments are, of course, to be avoided if possible on account of the high freight rates and possible damage or loss of material. However, several Texas schools have, in the past, secured local shipments from as far as Cincinnati and received the material safely. Had a list similar to this one been in the hands of these instructors a large part of the freight charges might have been saved. Where it is possible several schools in the same neighborhood should club together for a car load of from 6,000 to 12,000 board feet and thus economize on both freight and lumber prices.

All correspondence and inquiries as to dimensions, prices, seasoning, shipping points, etc., should be addressed directly to the firm from whom you contemplate a purchase.

The following list of varieties will enable one to identify the stock for sale by any given firm listed. The second part of the list of varieties is only sold by a few companies.

1.	Ash.	23.	Quar. white oak.
2.	Birch.	24.	Persimmon.
3.	Basswood.	25.	Pecan.
4.	Beech.	26.	Poplar.
5.	Cedar.	27.	Pine (white).
6.	Chestnut.	28.	Redwood.
7.	Cherry.	29.	Sycamore.
8.	Cottonwood.	30.	Tupelo (black gum).
9.	Elm.	31.	Walnut.
10.	Cypress.	32.	Willow.
11.	Plain red gum.	33.	Bay.
12.	Quar. red gum.	34.	Box elder.
13.	Plain sap gum.	35.	Buckeye.
14.	Quar. sap gum.	36.	Butternut.
15.	Hickory.	37.	Hackberry.
16.	Locust.	38.	Hemlock.
17.	Mahogany.	39.	Laurel.
18.	Maple.	40.	Norway pine.
19.	Magnolia.	41.	Sassafras.
20.	Plain red oak.	42.	Spruce.
21.	Quar. red oak.	43.	Tamarack.
22.	Plain white oak.	44.	Tropical woods.

Alabama.

Demopolis—Chickasaw Lumber Co.—1, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 23, 26, 29, 30.

Mount Vernon—Mobile River Saw Mill Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 22, 23, 26, 29, bay and yellow pine.

Arkansas.

Augusta—White River Land & Timber Co.—1, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 29, 30, 31, 32, sassafras and hackberry.

Calion—See Thomas & Proetz, St. Louis, Mo.

Crooked Bayou—See Geo. C. Brown & Co., Memphis, Tenn.

Helena—See Stimson Veneer & Lumber Co., Memphis, Tenn.

Jonesboro—See National Lumber Products Co., Chicago, Ill.

Jonquil—See J. H. Bonner & Sons, Memphis, Tenn.

Jerome—Jerome Hardwood Lumber Co.—1, 9, 11, 12, 13, 14, 20, 21, 22, 23, 29.

Little Rock—See Brown & Hackney, Memphis, Tenn. Surface and resaw.

Pekin—See Geo. C. Brown & Co., Memphis, Tenn.

Proctor—See Geo. C. Brown & Co., Memphis, Tenn.

Texarkana—Dorsey Land & Lumber Co.—1, 9, 10, 11, 12, 13, 14, 20, 22, 23.

Arkansas Soft Pine may be secured from any of the following firms. For small quantities near your locality write to Arkansas Soft Pine Bureau at Little Rock for information. The firms marked A. H. M. A. are members of the American Hardwood Manufacturers' Association. Probably more of these firms can supply hardwoods as well as soft pine.

Bearden—Cotton Belt Lumber Co.

Crossett—Crossett Lumber Co. (A. H. M. A.)

Eagle Mills—Eagle Mills Lumber Co.

Fordyce—Fordyce Lumber Co. (A. H. M. A.)

Malvern—Arkansas Land & Lumber Co.

Malvern—Wisconsin & Arkansas Lumber Co. (A. H. M. A.)

Millville—Freeman-Smith Lumber Co.

Thornton—Stout Lumber Co.

Warren—Arkansas Lumber Co.

Warren—Southern Lumber Co.

Warren—Edgar Lumber Co.

Georgia.

Atlanta—Cleveland-Oconee Lumber Co.—1, 4, 9, 11, 12, 13, 14, 15, 20, 21, 22, 23, 26, 29, 30 & pine. Oconee & Chalker, Ga.

Macon—Case-Fowler Lumber Co.—1, 4, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 26, 29, 31 & pine. Sales office in Philadelphia.

Macon—Massie & Felton Lumber Co.—1, 4, 8, 10, 11, 12, 15, 18, 19, 20, 21, 22, 23, 26, 30, 31 & pine. Sales office in Philadelphia.

Illinois.

Chicago—C. H. Worchester, 19 S. La Salle St.—1, 2, 3, 9, 18. Chassel and Ontonagon, Mich. Carload lots.

Chicago—National Lumber Products Co., Security Bldg.—1, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 31. Carload lots only. Caney Springs, Tenn.; Jonesboro, Ark.; Arcadia, Mo.; Mt. Comb, Miss.

Chicago—Pacific Lumber Co., 11 S. La Salle St.—Redwood only. Local shipments from Chicago and Kansas City. Carloads from Scotia, Calif.

Chicago—Utley-Holloway Co.—1, 8, 9, 11, 12, 13, 14, 20, 21, 22, 23, 25. Carload lots only. Clayton, Mo.

Chicago—Wisconsin Lumber Co., Harvester Bldg.—1, 8, 9, 10, 11, 13, 18, 20, 22, 23, 29. Surface and resaw. Deering, Mo.

Metropolis—E. C. Artman Lumber Co.—1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 25, 26, 29, 31 and plain and quartered black gum. Surface and resaw.

Mound City—Hendrix Mill & Lumber Co.—1, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 25, 26, 29, 30, 32, box elder, hackberry and quar. sycamore. Carload lots only.

Pekin—Langton Lumber Co. Walnut. (S)

Rockford—Litton Veneer Co.—1, 3, 9, 17, 20, 22, 23, 31. (S)

Indiana.

Evansville—Maley & Wertz Lumber Co.—1, 3, 4, 7, 9, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 26, 29, 30, 31. Memphis, Tenn.; Kilmo, Miss.; Grammer, Ind.

Fort Wayne—Hoffman Bros. Co.—1, 3, 4, 7, 9, 15, 18, 20, 21, 22, 23, 26, 29, 31. (S) Kendalville, Ind.

Huntington—See Stimson Veneer & Lumber Co., Memphis, Tenn.

Indianapolis—Hoosier Veneer Co.—1, 3, 4, 5, 7, 9, 15, 17, 18, 20, 21, 22, 23, 26, 29, 31. (S)

Indianapolis—Long-Knight Lumber Co.—1, 2, 3, 5, 7, 9, 10, 11, 15, 18, 22, 26, 27, 29, 31.

North Vernon—North Vernon Lumber Mills—1, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32. Louisville, Ky.; Dyersburg, Tenn.

South Bend—Hyde Lumber Co.—1, 9, 11, 12, 13, 14, 20, 21, 22, 23, 29, 30. Lake Providence, La.

Iowa.

Davenport—Gorden-Van Tine Co. Pl. Red. Oak. Cypress at St. Louis.

Des Moines—Des Moines Sawmill Co.—Elm and Walnut.

Kansas.

Kansas City—Frank Purcell Walnut Lumber Co. Walnut.

Kansas City—Frank Paxton Lumber Co.—1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, holly, spanish cedar and curly redwood.

Kentucky.

Ashland—Ashland Hardwood Lumber Co.—1, 3, 4, 5, 6, 7, 8, 15, 16, 18, 20, 21, 22, 23, 26, 27, 29, 30, 31, 32. Farmers, Ky.

Louisville—Holly Ridge Lumber Co.—1, 9, 11, 12, 13, 14, 20, 21, 22, 23, 25. Four Mills in La.

Louisville—Louisville Point Lumber Co.—1, 3, 4, 6, 9, 15, 18, 20, 21, 22, 23, 26, 29, 31. High Bridge, Ky.

Louisville—The Mengel Co.—Mahogany and tropical woods. (S)

Louisville—See North Vernon Lumber Mills, North Vernon, Ind.

Louisiana.

Baton Rouge—See E. Sondheimer Co., Memphis, Tenn.

Clayton—See Utley-Holloway Co., Chicago, Ill.

Donner—Dibert, Stark & Brown Cypress Co.—Cypress and Black Walnut. This firm has shown their interest in manual training to the extent of building and equipping a shop for their local schools.

Junks—See Alexander Bros., Belzoni, Miss.

Lake Providence—Hyde Lumber Co., South Bend, Ind.

Lake Charles—Powell Lumber Co.—13, 15, 20, 22 and pine. Reeves, La.

Rochelle—Tremont Lumber Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 19, 20, 22, 23, 28 and quar. black gum and golden bay.

Shreveport—Nelson Bros. Lumber Co.—1, 3, 4, 7, 9, 11, 13, 15, 20, 22, 25, 26, 30, and pine. Bungalo, La., and other La. and Texas points.

Shreveport—Peavy-Byrnes Lumber Co.—1, 4, 10, 11, 15, 20, 21, 22, 23, 25, 26, 30 and pine. Emad, La.; Peason, La.; Deweyville, Texas.

Tallulah—See E. Sondheimer Co., Memphis, Tenn.

Tendal—See G. W. Jones Lumber Co., Appleton, Wis.

Urania—Urania Lumber Co.—4, 10, 13, 22 and pine.

Michigan.

Boyne City—Boyne City Lumber Co.—basswood, beech and maple.

Chassel—See C. H. Worchester, Chicago, Ill.

Gladstone—Northwestern Cooperage & Lumber Co.—1, 3, 18, 27.

Newaygo—Henry Rowe Mfg. Co.—3, 4, 9, 22 and made to order parts. Turnings, knobs, etc. (S)

Ontonagon—See C. H. Worchester, Chicago.

Sagole—See Sawyer Goodman Co., Marinette, Wis.

Mississippi.

Bayland—See Bayou Land & Lumber Co., Cincinnati.

Belzoni—See Thomas & Proetz, St. Louis, Mo.

Belzoni—Alexander Bros.—1, 9, 10, 11, 12, 13, 14, 20, 21, 22, 23, 30. Junks, La.

Catchinas—See Thomas & Proetz, St. Louis, Mo.

Charleston—Lamb-Fish Hardwood Co.—1, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 24, 25, 29, 30. This firm shows more than usual interest in school and college trade.

Greenwood—Kraetzer Cured Lumber Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 25, 26, 29, 30. LeFore and Moorehead, Miss.

Kilmo—See Maley & Wertz Lumber Co., Evansville, Ind.

Leland—Darnell-Love Lumber Co.—1, 9, 10, 11, 12, 13, 14, 20, 23.

Louise—See Barr-Holaday Lumber Co., Greenfield, Ohio.

Meridian—C. L. Gray Lumber Co.—1, 9, 11, 12, 13, 14, 15, 19, 20, 22, 26, 29 and pine. Carload lots only.

Mt. Comb—See National Lumber Products Co., Chicago, Ill.

Percy—See Frank A. Conklin Co., Memphis, Tenn.

Sardis—Carrier Lumber Co.—11, 12, 13, 14, 20, 21, 22, 23.

Missouri.

Arcadia—See National Lumber Products Co., Chicago, Ill.

Deering—See Wisconsin Lumber Co., Chicago, Ill.

Kansas City—Chapman & Dewey Lumber Co., Rialto Bldg.—1, 9, 11, 12, 13, 14, 18, 20, 21, 22, 23, 29.

Kansas City—Connelly Hardwood Lumber Co., 18th & Ind. Ave.—1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 25, 26, 27, 28, 30, 31.

Kansas City—Kansas City Hardwood Lumber Co., 1700 Brooklyn Ave.—1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32 and hackberry.

Kansas City—Turner Dennis & Lowry. Spruce, white and yellow pine. Carloads only.

Kansas City—For redwood see Pacific Lumber Co., Chicago, Ill.

St. Louis—Chas. F. Luehrmann Hardwood Lumber Co., 148 Carroll St.—1, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 26, 27, 29, 30, 32.

St. Louis—Cornelius Lumber Co., Arcade Bldg.—1, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30 and 32.

St. Louis—J. P. Lawrence Lumber Co., Syndicate Trust Bldg.—1, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 29 and 30. Southern mills.

St. Louis—Thomas & Proetz, 3400 N. Hall St.—1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 18, 19, 20, 21, 22, 23, 26, 29, 30 and 32. Belzoni, Miss.; Catchinas, Miss.; Calion, Ark.

St. Louis—See Gorden-Van Tine Co., Davenport, Ia.

Ohio.

Cincinnati—Bayou Land & Lumber Co., Neave Bldg.—9, 11, 12, 13, 14, 20, 21, 22, 23, 29, 30. Bayland, Miss.

Cincinnati—J. W. Darling Lumber Co., 4th & Plum St.—9, 10, 11, 12, 13, 14, 18, 20, 21, 22, 23, 25, 28, 29, 30 and 32. Mills in La., Miss., Colo. and Fla.

Cincinnati—Mobray & Robinson Co. Box 854—1, 3, 4, 6, 15, 18, 20, 21, 22, 23, 26, 31. Mills in Ky., Ark., Ohio and Ind.

Cincinnati—Ohio Veneer Co.—1, 3, 5, 7, 11, 12, 13, 17, 18, 20, 21, 22, 23, 26, 27, 29 and 31. (S)

Columbus—American Column & Lumber Co., Brunson Bldg.—1, 2, 3, 4, 6, 7, 15, 17, 20, 22, 23, 26, 29, 30, 31. Butternut, buckeye and hemlock.

Greenfield—Barr-Holaday Lumber Co.—9, 11, 12, 13, 14, 15, 20, 21, 22, 23, 25. Louise, Miss.

Ironton—Fisher-Elmer Co.—1, 2, 3, 4, 6, 9, 15, 18, 20, 21, 22, 23, 26, 29, black and white walnut and pine. Surface, resaw, rip and sand.

Tennessee.

Caney Springs—See National Lumber Products Co., Chicago, Ill.

Dyersburg—See North Vernon Lumber Mills, North Vernon, Ind.

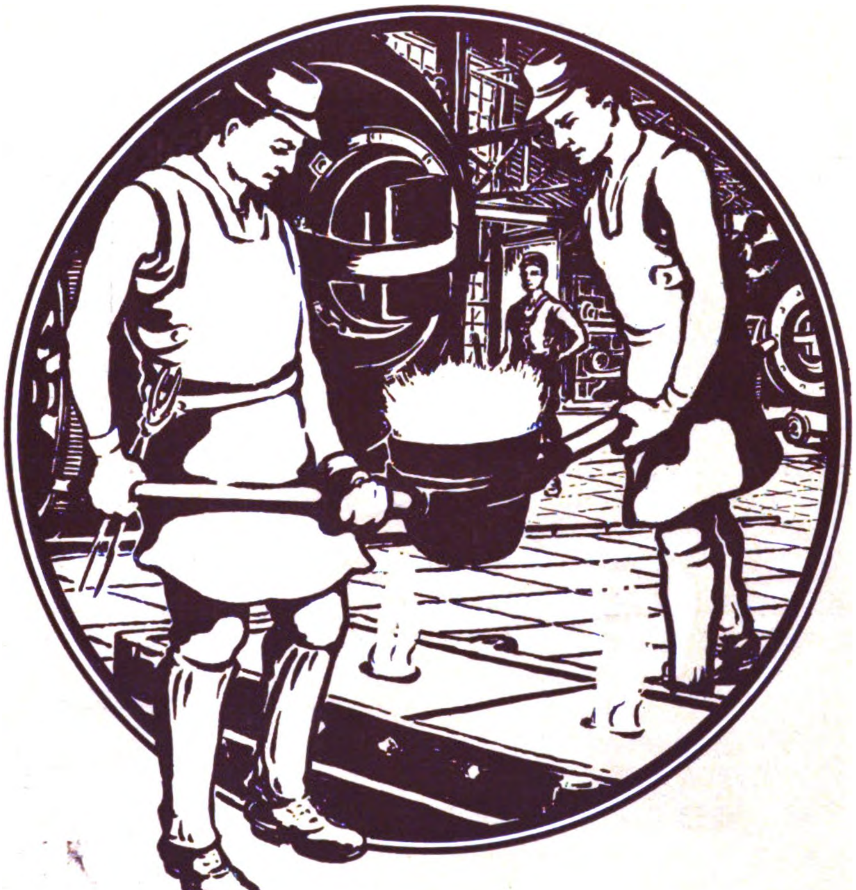
Jackson—Benda Young Lumber Co.—Poplar and quar. white oak.

Memphis—Brown & Hackney, Commerce Bldg.—1, 9, 10, 11, 12, 13, 14, 20, 22, 23, 29. Little Rock, Ark. Resaw and surface at Little Rock.

Memphis—E. Sondheimer Co.—1, 9, 10, 11, 12, 13, 14, 20, 21, 22, 23, 25, 30 and 31. Sondheimer, Baton Rouge and Tallulah, La.

Memphis—Frank A. Conklin Co.—1, 9, 10, 11, 12, 13, 14, 18, 20, 22, 23. Percy, Miss.

The INDUSTRIAL ARTS MAGAZINE



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EDITORIAL CONTRIBUTIONS

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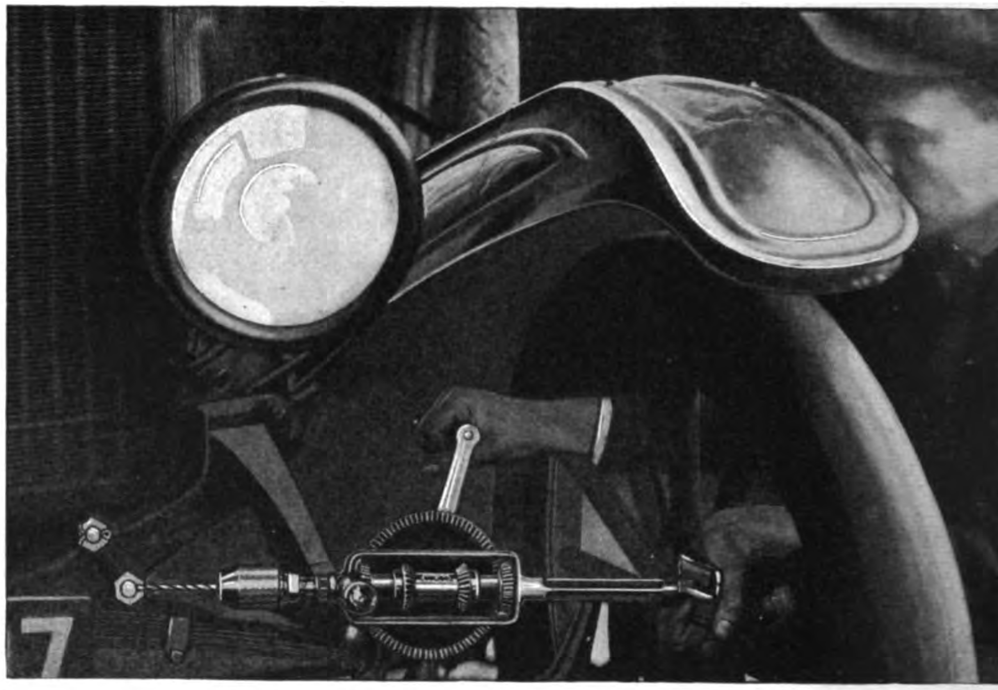

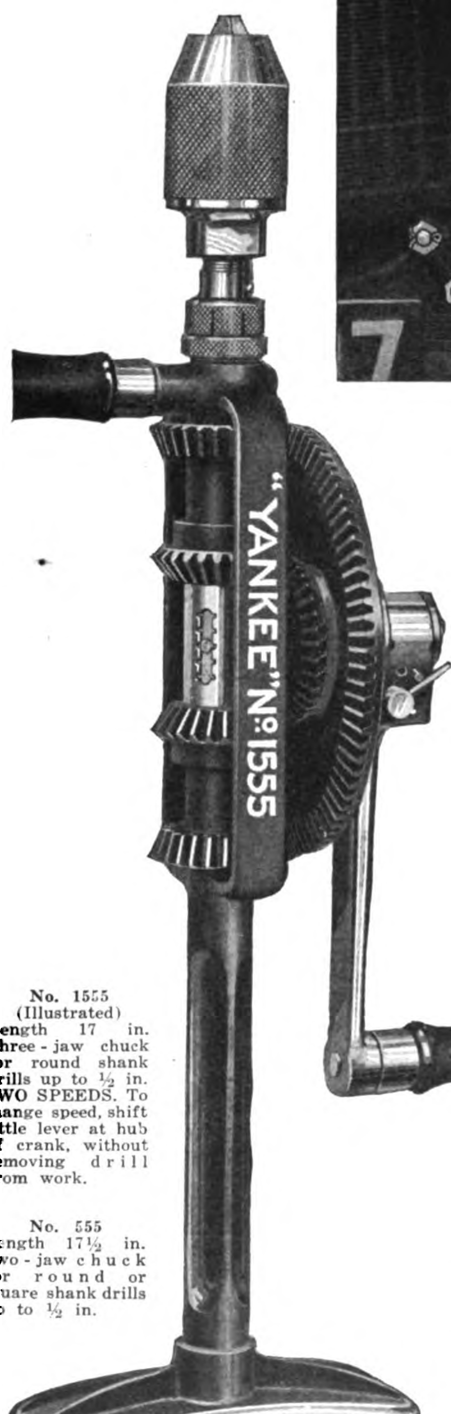

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INDUSTRIAL-ARTS MAGAZINE

Volume X NOVEMBER, 1921 Number 11

Industrial-Arts and Prevocational Education in Our Intermediate and Junior-High Schools

II. ORGANIZING AND CONDUCTING REPRESENTATIVE ACTIVITIES

A. H. Edgerton, Indiana University

MANY promising results and a few striking inadequacies have been pointed out in connection with recent investigations of the seventh, eighth, and ninth grade industrial activities in 379 of the most progressive intermediate and junior high schools in the United States. In studying these data, one is impressed by the marked improvements in content and method which have been realized during the past five years. Undoubetdly this progress is due partially to our greater tendency to insist upon having courses of study in industrial education programs based upon clear-cut needs and objectives. In judging the worth of *what* and *how* we teach in the shop and other related courses, both administrators and teachers have found it advantageous to distinguish more clearly between the aims and purposes of those courses which have more or less indirect vocational significance, but are offered mainly for general educational ends, and those units which point directly to a means of preparation for wage-earning occupations. However, there still is a wide difference of opinion with respect to the most suitable methods for organizing and offering the former courses, especially with the thought of having seventh, eighth and ninth year boys learn most effectively and economically.

In some respects, the various claims for the industrial arts courses might be considered as hopeful expressions of ideals rather than as representing the present status and conduct of this work. This is one more indication of the progressive spirit which is backing the movement in this country for democratic ideals in our public school systems. Notwithstanding the similarity noted in the chief claims, which after all differ largely as to the amount of emphasis given to each item, the achievements observed in a number of schools make it evident that a decided difference exists both in the conception of the claims themselves and also as to how these can be realized most satisfactorily.

Reasons for Offering Courses.

In the reports from 303 schools, each of which gave its main reason for offering instruction in the industrial arts and related studies, the four leading claims, when collated, were found to be given the following order of importance:[6]

1. Contributing to the general experience, all-around development, and industrial intelligence.
2. Aiding in the intelligent selection of industrial occupations without encouraging early choices.
3. Enriching the school experience of the pupil through concrete situations.
4. Preparing for entrance into industrial vocations in the school and through cooperation outside.

It is obvious that these claims give little clue to the actual content and method of the courses which they represent.

Determining the Important Need for Courses.

Although over 80 per cent of the 379 schools investigated state that their industrial activities aim (1) *to develop the pupil's special aptitudes and capacities* and (2) *to prepare him for the demands which the future is going to make upon him,* there is a decided range of opinion as to how these objectives are to be accomplished. Many of the school authorities seriously believe that the success of the industrial arts instruction depends upon the extent to which the work is organized and offered in approximation of the processes, problems, and conditions in the divisions of industry represented.

It is encouraging to observe that *over 67 per cent of these intermediate and junior high schools are attempting to broaden and vitalize the industrial activities which heretofore have consisted mainly of shop work* (often limited to benchwork in wood.) The junior high schools of Los Angeles, California, offer a good illustration of this change which has taken place in many systems during the past two or three years. In this case, the shop courses, which formerly covered three years of woodwork, have been reorganized to give

[6]See Table II in the introductory article for number and per cent of schools which emphasized each item.

pupils so-called vocational exposure along with the study of occupations for the purpose of enabling them to enter their lifework with some vision of the vocations. Experience already has shown that the industrial arts or prevocational courses are an incentive for causing pupils to enter the senior high school, in which case they are prepared to elect vocational or other courses more intelligently and to make progress from the outset.

Industrial Work a Functional Activity.

Because it is impossible to represent all of the various recognized wage-earning occupations in the local community, a small number of the schools have concluded for the present, at least, to consider the industrial work more as an intellectual or liberal study than as a functional activity. The shopwork observed in several of these schools resembles the earlier form of manual training which was introduced at that time as a mental discipline rather than as a practical subject. As a result, such courses are so formal and isolated that they apparently fail to connect up with the practical applications of everyday life. Even the technique, which is emphasized in making different abstract pieces and exercises, does little to inculcate habits of productive industry, thrift, and service as occasionally is claimed.

It unquestionably would be both impracticable and undesirable for any school to fully represent so great a variety and number of highly specialized occupational pursuits as are listed for any of our cities of mixed industries in the last Special Report of the United States Census. The expenditure could be justified neither on the basis of vocational efficiency nor because of educational needs. An investigation which was conducted a few years ago by Dr. L. P. Ayres, of the Russell Sage Foundation, in order to ascertain the facts concerning the conditions in 78 American city school systems, has some bearing on this claim that the intermediate or junior high school should participate in a program for industrial education "that will directly prepare the children to enter the local industries." The facts regarding the birthplace of the 13-year old boys in the public schools of those cities, which were between 25,000 and 200,000 population, show that "only one father in six was born in the city where he now lives and only a few more than one-half of the boys were born where they now live."[7] Table III shows the detailed facts of the 22,027 cases studied by Dr. Ayres.

On the other hand experience of the past few years has demonstrated clearly that it is possible to offer well-organized units of typical activities, which will develop varying degrees of industrial intelligence and give insight into the condition in a number of modern industries without the danger of over-emphasizing the limitations in localized and undesirable occupations. This does not mean that we should be unmindful of the *local needs and interests* in representing and organizing industrial-arts courses for any community. The local well-being of the home and community in an agricultural section, for example, demands a somewhat different emphasis in its industrial work than would be offered to meet the needs in a city of mixed industries.

Table III. Facts Concerning Birthplace of 22,027 Boys and Their Fathers Indicate that Large Majority of Adults Will Not Work in Same Communities Where Schooling is Received.

	Boys		Girls	
Birthplace	Number	Per Cent	Number	Per Cent
Same City	12,699	58	3,601	16
Same state but not same city	4,233	19	5,349	24
Other states in United States	3,069	14	4,364	20
Foreign country	2,026	9	8,713	40
Total	22,027	100	22,027	100

Wide Range in Content of Industrial Courses.

Rural industrial work, which mainly concerns itself with farm projects that are carried on inside and outside of the school shop, represents one type of local interest for helping to determine the content and method in several of the schools reporting. With few exceptions, the essentially rural communities state that notable progress has been made by abandoning the absurd practice of basing their procedure largely upon the courses and methods of the larger school systems. For obvious reasons, the all-around or farm-workshop plan, already described as a solution for the industrial arts in the smaller community, likewise is found most suitable for the limitations of these rural intermediate and junior high schools.[8]

Such closely related activities as carpentry, concrete construction, harness repair, forging, bench metal work, gas engine operation, machine assembly and repair, farm woodwork, and the like are taught by the local instructor, who frequently extends the opportunity for concrete experiences and information by cooperating with practical men and establishments in the community. It is evident that the needs in any one of these activities call for a diversity of dexterity and knowledge for understanding, for constructing, improvising and repairing products to be used on the farm and in the home. The needs in farm woodwork, for instance, are not so much for products involving carefully made, close fitting joints as they are for such comparatively rough but useful constructions as potato crates, gates, brooders, hen-coops, cold frames, seed testers, corn-cribs, garages, eveners, single-trees and various rebuilding and repair jobs. The schools which stress the home needs as a part of the farm-mechanics courses often include the renewal and repair of such utilities as faucets, window and door screens, plumbing, electrical fixtures and appliances, the adjustment of window shades, door locks, lawn mowers, doors that bind; also, the making of the many other adaptations which must

[7] Ayres, L. P. "Some Conditions Affecting Problems of Industrial Education in 78 American School Systems." Russell Sage Foundation Publication.

[8] Roehl, L. M. "A Farm Workshop." INDUSTRIAL-ARTS MAGAZINE, Nov., 1915, Vol. IV.

necessarily be met in rural communities. When properly offered in terms of the school and home projects, the industrial activities and related studies furnish excellent possibilities for unifying the school, the farm and the homelife of all concerned.

Industrial-arts courses in cities of mixed industries are being organized more and more to include different types of representative experiences chosen from present-day industrial callings. Beginning in the seventh grade, boys in many cities of over 10,000 population are given short courses in a number of shop units as a tryout, or so-called prevocational, period. This system frequently gives both the pupils and teachers some basis for the future selection of courses and occupations. Some of the schools insist that they are extending these opportunities in order to give special preparation for entrance into the skilled trades. For example the Hackley Manual Training School, at Muskegon, Mich., allows its pupils to elect vocational or trade school courses at the end of the seventh year, if circumstances make it impossible or undesirable for boys to continue through the regular high school. Perhaps the industrial courses in the Lafayette Bloom Junior High School, at Cincinnati, O., give one of the best illustrations of a department which primarily aims to offer an earlier beginning in specific training for those boys who leave school without much further preparation. These courses are the exception, however, as a large majority of the schools report that they are making no special attempt to emphasize proficiency in specific occupations as low as the seventh and eighth grades, because of their conviction that the industries offer little to boys under 16 years of age. Nevertheless, a comparatively large number of schools in this group insist that boys can be given enough freedom in choice and sufficient variety of industrial experiences to help many in the selection of their lifework and some in the beginning of their preparation for it.

The most progressive of these industrial-arts courses which are designed, in part, to try out interests in order to determine likes and dislikes, and to test capacities for understanding and doing industrial and mechanical work, do tend to contribute more toward the vocational efficiency of the pupils during the ninth grade. This would seem to be the psychological and physiological time to place somewhat greater emphasis upon technique and the related technical information. As a result of the various try-out experiences in the seventh and eighth years, some pupils are found taking more intensive work in courses already started while others investigate new activities or experiment with selected problems. This practice is also increasing in those schools which take the attitude that while a number of the boys will not be adapted to industrial work, either in interest or ability, all boys should have an intelligent understanding of productive industry as to processes, conditions, and relationships.

General Methods in Organizing Try-Out Courses.

In the best of these courses, each pupil participates in a reasonable amount of work which stresses the atmosphere and, to some extent, the time element and accuracy of the commercial plant.[9] Whenever the equipment in the school shop, for example, will not allow boys to do their work by the most practical methods, it is made clear how this would be taken up in the commercial shop and that their work is being carried on in as practicable a manner as possible with the necessarily limited shop facilities. This and other information relative to the methods used in larger productive industries is gained through such sources as planned excursions, reliable reading matter, student reports, motion pictures, class discussions and talks by specialists.

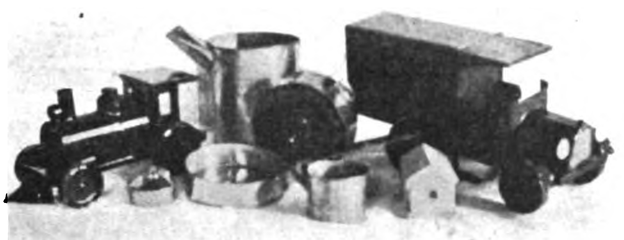
As would be expected, there is some variation both in the kinds and in the organization of shop activities represented in the various school systems. The Ettinger plan, in New York City, for example, provides for the rotation of a combination of nine-week units in designated intermediate schools, where the boys get experience in machine work, sheet metal, printing, wood working, electric wiring, plumbing, drafting, garment design, sign painting and bookbinding. This plan is so organized that a boy who has unusual ability may receive special training without completing the cycle.

The junior high school, at Grand Rapids, Mich., also rotates the boys in printing, sheet metal work, automobile construction, wood working, machine shop practice, electrical construction, forging and mechanical drawings for one double period daily. This school undertakes to have each boy sample the eight activities for ten-week periods during the seventh and eighth years, in order that he may continue one elected activity more intensively for the entire year.

At School No. 47, Buffalo, N. Y., the industrial activities include machine shop practice, forging, sheet metal work, pipe fitting (for the seventh grade), bench woodwork, plaster casts, wood turning, pattern making and molding, electrical work (for the eighth grade), carpentry, cabinet making, wood finishing, pattern making and foundry work, concrete construction (for the ninth grade), and mechanical drawing (for all grades). The boys in this school spend three hours or one-half of the school day in these try-out courses.

There is an attempt to separate the try-out and technical activities from the socalled vocational work in the Washington Junior High School, at Rochester, N. Y. As will be explained in more detail later, the printing, millwork, pattern making, sheet metal work, painting and decorating, and mechanical drawing facilities are used in common for both types of courses during separate periods, while the cabinet making, machine, electrical and automobile shops are reserved especially for either purpose.

[9]Edgerton, A. H. "To What Extent Can We Justify the Use of Machinery in Our School Shops on the Basis of Its Efficiency?" INDUSTRIAL-ARTS MAGAZINE, Nov., 1915, Vol. IV, p. 202.



A FEW OF THE SHEET METAL PROBLEMS WHICH WERE SELECTED AND DEVELOPED DURING THE LATTER PART OF THE COURSE.

The Thirtieth Street Junior High School, at Los Angeles, California, which has already been referred to in this article, is organizing its activities "so that there will be little woodwork in the seventh and eighth grades." This school has organized its widely varied try-out courses in the seventh year "to consist of ten weeks of agriculture, ten weeks of mechanical drawing, ten weeks of typewriting and ten weeks of printing. These courses are to be followed in the eighth year by ten weeks of sheet metal, ten weeks of electrical work, ten weeks of concrete work, and ten weeks of plumbing. It is the intention to have the ninth year courses so organized that the work of the previous grades may be worked out into vocational classes for the higher grades." Regarding the content of these industrial-arts activities, Assistant Supt. Helen S. Watson reports as follows: "In all of this work, the emphasis is placed upon the practical side. In the Boyle Heights Junior High School, for example, all repairs of school furniture, locks, making of keys, construction of shelving, cupboards and tables are done by the regular classes. Concrete workers have built retaining walls and repaired walks, and are now constructing a pit in the machine room for the installation of motor and shafting. A lath house, including the installation of plumbing and the building of a fence, is now being made for the agricultural department. It is understood that at least one-half of the time of the older boys may be spent on work for the school.

How Industrial-Arts Activities Are Conducted.

The amount of emphasis which is given to each element in these and other try-out courses shows even greater variation than has been noted in the activities themselves. However, a great majority of the least hampered intermediate and junior high schools ---231 or 61 per cent of those which reported--- have organized their industrial arts courses so that *each concrete experience brings boys in contact with information on some phase of the conditions and processes encountered in present-day industry and occupations, as well as with the materials, tools and methods of manipulation in the activities represented at the school.* Regardless of the nature of the project, problem, or job-- whether it happened to be a division of concrete construction, carpentry, electrical work, printing, machine shop, drafting, or any other industrial pursuit--each boy in these courses gives little or much time (approximately from five to 35 per cent of the total time allowed) to such types of closely-related information as the kinds and properties of material used; the particular form of design and construction needed; the methods of manufacture practiced outside; and the principles and facts affecting the conditions and relationships under which workers work. Nearly all of the manual experiences which naturally are made the basis of opportunity for giving this *information to extend the boy's industrial horizon,* result in useful and semi-commercial products and service.

Basis of Semi-Commercial Work.

The greater part of this semi-commercial work (estimated as high as 95 per cent in some schools) is based upon the construction and repairs needed in the school systems. Only a few of the schools feel free to state that the requirements of repair or productive work in their systems are considered second in importance to the pupils' needs beyond these immediate experiences. Furthermore, over two-thirds of the instructors in the 231 institutions mentioned above, admit that they can not justify the time and effort required for a large proportion of this construction and repair work, especially when they are ordered to deliver the products within a limited time. The reasons which were given most frequently by 157 individuals for their dissatisfaction with the over-emphasis and unregulated demands of the school system upon repair and maintenance construction

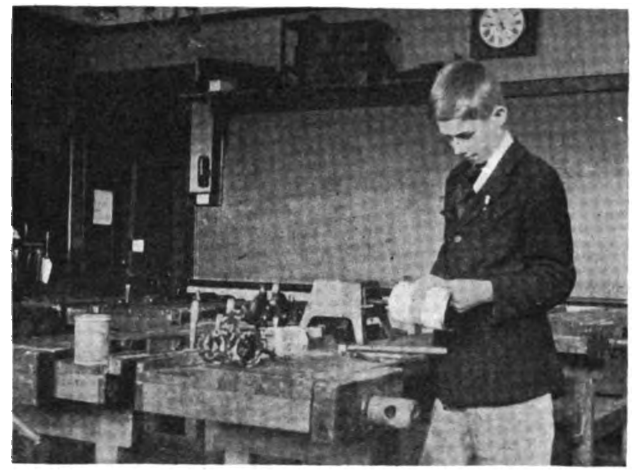
Table IV. Each of 157 Individuals Gives Reasons for Dissatisfaction With Continuous Demands Upon Industrial-Arts Activities for Repair and Productive Work.[1]

ITEM—	NO.
Unregulated requirements limit the amount of instruction given.	
1. Technical information for enlarging the understanding of tools, materials, operations, and principles directly related to the shopwork	37
2. Vocational information for illuminating the school experiences by giving insight into commercial processes and methods employed in economic production	28
3. Occupational information for helping to appreciate and judge labor conditions, importance of work, health problems, future opportunities, qualifications and training	21
Narrow limitations in maintenance needs of schools tend to:	
1. Prevent representation of proper forms of industrial experiences to meet various needs of pupils	32
2. Require instructors to do much of the planning and construction work for pupils	17
3. Cause difficult operations to frequently precede the simpler ones	8
Extended repetition of same operations and processes seem to:	
1. Give too highly specialized skill for boys of this age	14
2. Cause adolescent boys to lose interest in work with little variation	11
3. Limit scope of acquaintance with typical tools, machines, materials, and processes of manipulation	7

[1]These numbers will total more than 157, as several individuals reported more than one reason.

work, are summarized in Table IV. It should be noted that the main objections are to the effect of limiting the industrial experiences to the manual aspects of the work; namely, preventing the instruction from including a larger understanding of the processes and conditions in the industries represented, by failure to regulate these valuable experiences in order that the pupils' needs and interests might receive first consideration.

Nevertheless, increasing numbers of schools are adding other concrete experiences besides those which tend to furnish the largest financial return by materially reducing the annual budget for repairs and production work. These new industrial-arts activities seem to be allowing a larger percentage of time for the study of those methods, conditions and relationships that are involved in the divisions of industry which the school experiences represent. Although boys of this age are interested primarily in the various phases of the direct manual experience, more and more instructors have come to recognize the need for vitalizing the manipulative aspects of the activities by introducing thought-provoking situations. Both projects and problems in these courses include a *breadth of instruction* which stimulates thought for better understanding, insight and appreciation. A few representative types of the directly and indirectly related information, which boys acquire profitably as they plan and construct products having real use value, are listed in the first section of Table IV.



EIGHTH GRADE BOY AT HASTINGS, NEW YORK, MAKING BATH-ROOM FIXTURES FOR A DOLL-HOUSE PROJECT IN THE SHEET METAL CLASS.

(To be continued.)

PROBLEMS FOR HALLOWE'EN

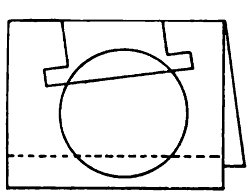
Miss S. E. E. Hammond, Assistant Supervisor of Art, Springfield, Mass.

No. 1.

Material:

1 pc. manila paper 6″ x 9″.
One 3″ circle of medium weight paper.

Fold paper 6″ x 9″ on short diameter. Fold 6″ edge to form strip about 1″ x 6″. Trace circle allowing circle to extend over fold. Illustration 1. Draw short line across top of circle. Finish outline for hat. Illustration 2. Color face orange, features, hat, and lower strip black. Cut on lines and fold. See picture. Repeat color on opposite side.



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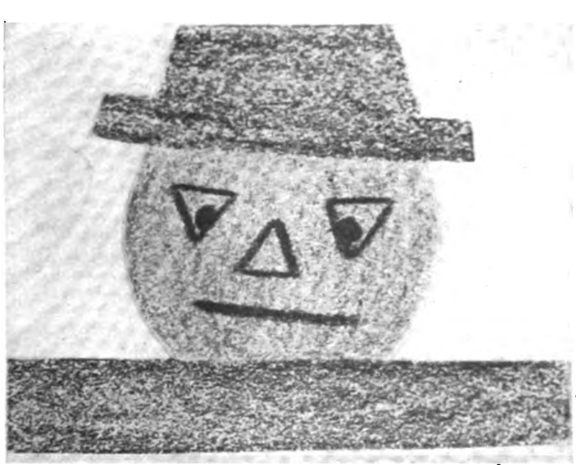


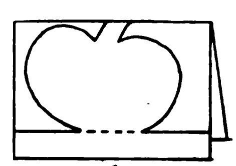
PROBLEM 1.

No. 2.

Material:

1 pc. manila paper 4½″ x 6″.

Fold paper 4½″ x 6″ on short diameter. Fold 4½″ to form oblong about ½″ x 4½″. Unfold. Cut as



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PROBLEM 2.

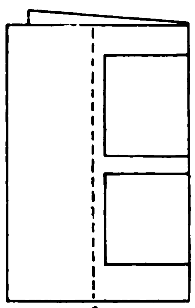
shown in Illus. 3. Color pumpkins using yellow and orange crayon. Color stem green, oblong $\frac{1}{2}$" x $4\frac{1}{2}$" brown or black. Use black for features. Repeat colors on opposite side.

No. 3.

Material:

1 pc. brown paper 6" x 8".
1 pc. black paper 4" x 6".
2 pcs. orange paper $2\frac{1}{2}$" x 3".

Fold brown paper 6" x 8" on short diameter. Unfold, fold 6" edge to fold. Repeat with opposite 6"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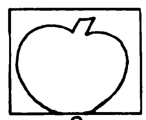
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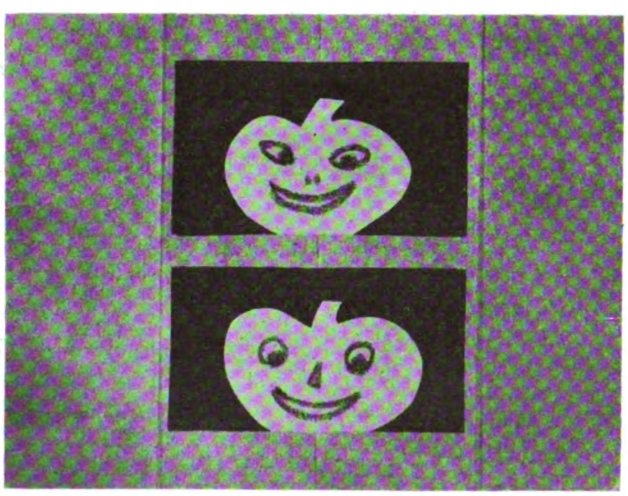
edge. Unfold. Refold on first fold. Paper is now 4" x 6". Cut as shown in Illus. 4, having top margin about $\frac{1}{2}$" and lower margin about $\frac{3}{4}$". Unfold. Refold oblong 2" x 6". Paste black paper 4" x 6" on back of cut out paper. From orange papers $2\frac{1}{2}$" x 3"



PROBLEM 3.

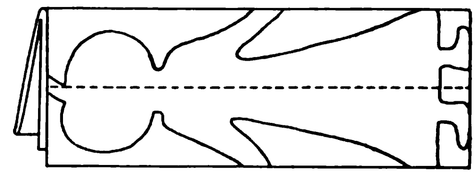
cut two pumpkins. Illus. 5. Draw features with black crayon. Paste in position. See picture.

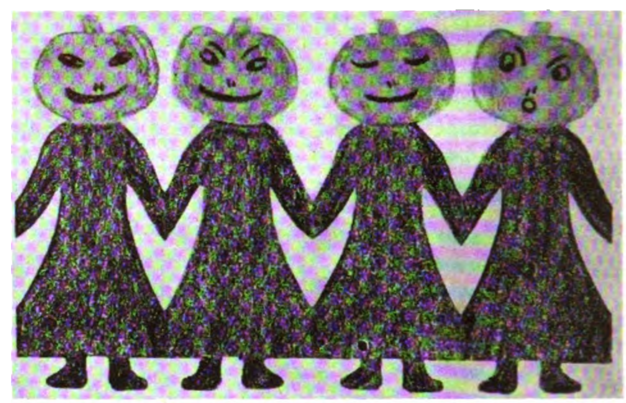
No. 4.

Material:

1 pc. manila paper 6" x 9".

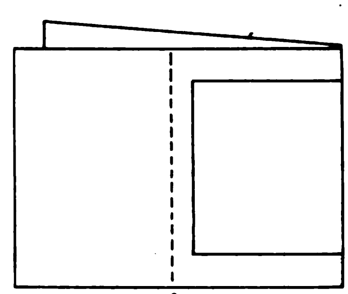
Fold manila paper 6" x 9" on short diameter. Keep folded, fold again. Paper is now $2\frac{1}{4}$" x 6". Fold one 6" edge back to 6" fold. Unfold last fold. Using last fold as guide cut four connected pumpkin dolls. Illus.





PROBLEM 4.

6. Color pumpkins orange, stems green, features black, dresses and feet black or any desired color. Repeat colors on opposite side.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PROBLEM 5. OPENED.

No. 5.

Material:

1 pc. brown paper 4½" x 12".
1 pc. orange paper 4½" x 6".
1 pc. black paper 2" x 6".
1 pc. black paper 2" x 2½".

Fold brown paper 4½" x 12" as in No. 3. Cut as shown in Illus. 7. Cut one 6" edge of black paper 2" x 6" to represent trees, steeples, and house tops. Paste on back of brown paper at lower edge of opening. Paste orange paper on back of brown paper. Cut old witch on broom and moon from black paper 2" x 2½". Arrange and past on orange paper. See picture.

No. 6.

Material:

1 pc. black paper 6" x 9".
2 pcs. manila paper 3" x 4½".

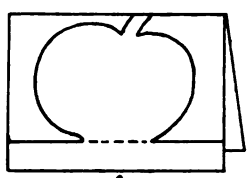
Fold black paper 6" x 9" on short diameter. Unfold, fold 6" edge to fold. Repeat with opposite 6" edge. Fold one manila paper 3" x 4½" on short diameter. Fold 3" edge to form oblong about ½" x 3". Cut pumpkin. Illus. 8. Repeat with second manila paper 3" x 4½". Color both sides of pumpkins orange, stems green, features black. Fold black paper on first fold. Paper is now 4½" x 6". Place pumpkin heads on black paper. Illus. 9. Place four points 1-2-3-4 on black paper on fold. With pin points cut fold between 1 and 2, and 3 and 4. Fold back one end of double strip of manila paper ½" x 3", slip strip in slit putting long end in first, unfold folded end. Repeat with other pumpkin head. Paste strips at ends to black paper each side of fold. Fold oblong x on oblong o, paste each end to hold in place.

No. 7.

Material:

2 pcs. black paper 6" x 9".
1 pc. thin orange paper 2½" x 3".
1 pc. thin orange paper 1" x 2½".

Fold one piece black paper 6" x 9" on long diameter. Cut Pumpkin Lady. Features should be good



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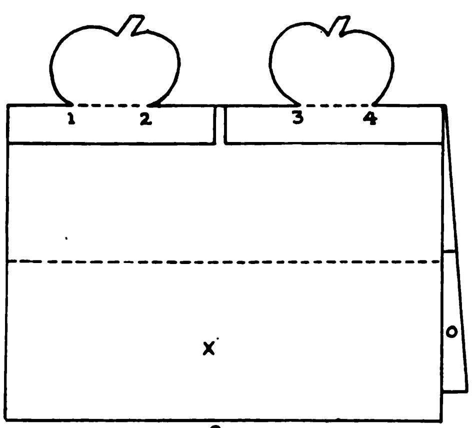

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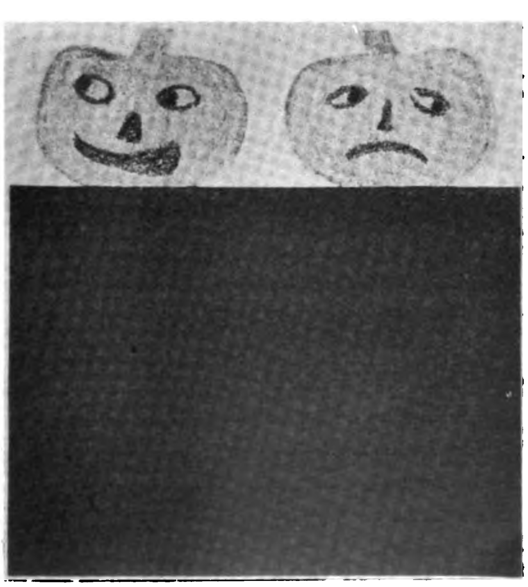
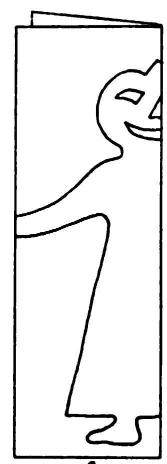


PROBLEM 6.



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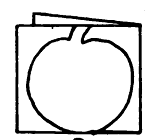

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PROBLEM 7.

size. Illus. 10. Fold second black paper 6" x 9" on long diameter. Place first black paper on second black paper, trace, and cut. Cut thin orange paper 2½" x 3" size of pumpkin head, apply paste to edge, paste, paste on

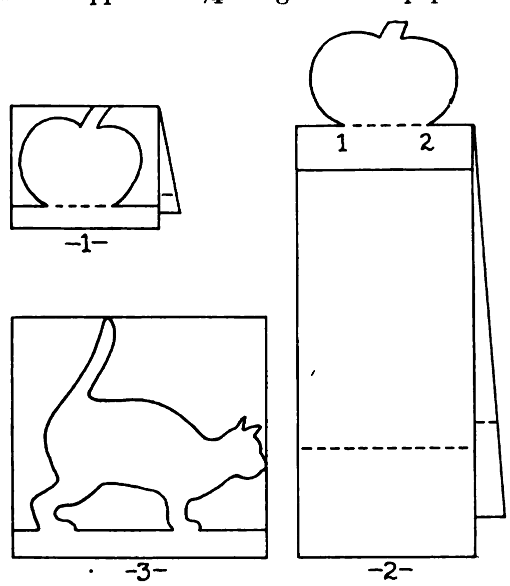
black paper. Paste second black pumpkin head to opposite side of orange paper. Care should be taken to see all edges of one black paper match edges of other black paper. Fold thin orange paper 1" x 2½" on short diameter. Cut two pumpkins from this folded paper. Illus. 11. Place a little paste inside each of the four hands, slip pumpkin between each two hands, press together firmly.

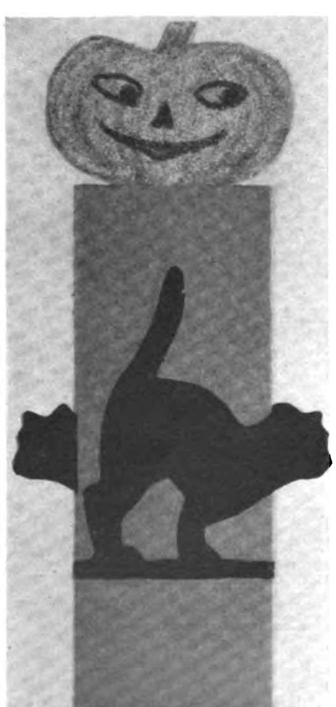
No. 8.

Material:

1 pc. blue paper 4½" x 12".
1 pc. manila paper 3" x 4½".
2 pcs. black paper 3½" x 8½".

On blue paper 4½" x 12" draw 12" line 1" from and parallel to one 12" edge. Repeat on opposite 12" edge. Fold on 12" lines. Paper is now 2¼" x 12". Draw 2¼" line 1½" from and parallel to one 2¼" edge. Repeat on opposite 2¼" edge. Fold paper on short





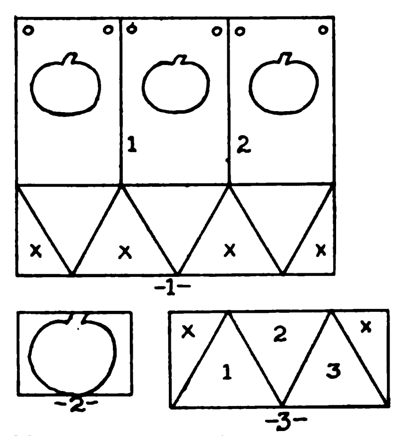
PROBLEM 8.

diameter with 2¼" lines on outside. Fold on each 2¼" line. Fold manila paper 3" x 4½" on short diameter. Fold 3" edge to form oblong about ½" x 3". Unfold last fold. Cut pumpkin. Illus. 12. Using colored crayons color pumpkin yellow and orange, stem green, draw features with black. Repeat coloring for opposite pumpkin. Fold blue paper so it is 2¼" x 6". Illus. 13. Place pumpkin head on blue paper. Illus. 14. Place two points 1 and 2 on fold of blue paper. Unfold blue paper. With pin point cut fold between points 1 and 2. Fold back one end of double oblong ½" x 3" on pumpkin head, slip oblong in slit of blue paper long end first, unfold folded end, separate oblongs, refold blue oblongs 1" x 12". Fold on short diameter so blue paper is again 2¼" x 3". Illus. 15. From black paper 3½" x 3½" cut cat. Illus. 16. On other black paper trace cat and cut out. Paste cats in position. See picture. Cut off extending strips. Slip oblong 1½" x 2¼" into opposite oblong 1½" x 2¼".

No. 9.

Material:

1 pc. dark blue paper 7" x 9".
1 pc. gray paper 2½" x 6".
3 pcs. thin orange paper (crepe paper may be used) 2½" x 3".



3 pcs. thin orange paper (crepe paper may be used) 2½" x 3½".
1 pc. manila paper 2" x 2½".
1 pc. dark blue raffia 12".
1 pc. orange raffia 12".

On dark blue paper 7" x 9" draw 9" line 2½" from and parallel to one 9" edge. Mark off 9" line in 3" measures. On opposite edge of oblong 2½" x 9" place dots at 1½", 4½" and 7½" respectively. Illus. 17. Connect points as shown. Cut out parts marked x. Mark off 9" edge in 3" measures. Draw lines 1 and 2. Fold on these lines. From manila paper 2" x 2½" cut pumpkins. Illus. 2. Using this as pattern trace pumpkin on each of three oblongs 3" x 5". Illus. 18. Cut out pumpkins. Place thin orange paper 2½" x 3½" back of pumpkin opening, draw features with black crayon. Repeat with other two orange pieces 2½" x 3½". Paste orange paper 2½" x 3" at four corners back of pumpkin shaped opening. Repeat with other two orange papers 2½" x 3" back of other two pumpkin shaped openings. Paste orange papers 2½" x 3" over orange papers already pasted, placing features next

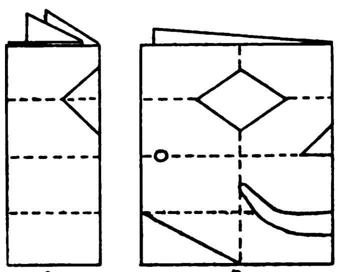
to pasted orange paper. Punch six holes. Illus. 19. Twist blue and orange raffia, thread through holes, fold ends back, paste down on inside. On gray paper 2½" x 6" place dot at middle point of one 6" edge. On opposite 6" edge place dot 1½" from end of edge. Repeat at opposite end. Two dots are 3" apart. Illus. 20. Draw lines as shown. Cut out parts marked x. Paste triangles of base of transparency on triangles 1, 2, and 3.

No. 10.

Material:

1 pc. black paper 6" x 9".
2 pcs. cord 14".

Fold black paper 6" x 9" on long diameter, unfold, fold 9" edge to fold. Repeat with opposite 9" edge.



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Unfold paper. Fold paper on short diameter, keep folded, fold again. Paper is now 2¼" x 6". Cut eye. Illus. 21. Unfold last fold. Paper is now 4½" x 6". Cut nose, mouth, and side of chin. Illus. 22. Punch holes, tie cords in holes.

No. 11.

Material:

1 pc. gray paper 9" x 12".
2 pcs. cord 14".

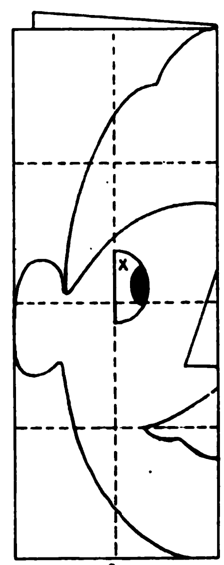
Fold gray paper 9" x 12" on short diameter, unfold, fold 9" edge to fold. Repeat with opposite 9" edge. Unfold paper. Fold paper on long diameter, unfold, fold 12" edge to fold, repeat with opposite 12" edge. Unfold paper. Refold on long diameter. Paper is now 4½" x 12". With black crayon draw one-half of mast. Illus. 23. Cut out just outside line. Cut out part of eye marked x. Outline other half of mask. The cap may be colored any color desired. Tie cords around each ear.

No. 12.

Material:

1 pc. gray paper 9" x 12".
2 pcs. cord 14".

Fold gray paper 9" x 12" in sixteen oblongs as in No. 24. Unfold paper. Fold paper on short diameter. Paper is now 6" x 9". With black crayon draw half of mask. Illus. 25. Cut out just outside line. Cut out part of eye marked x. Outline other half of mask. Color hair including puffs over ear black. Tie cords in holes.



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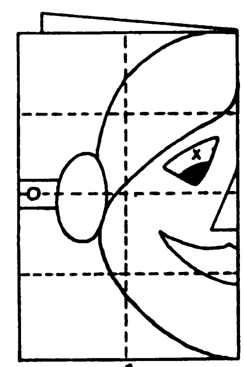

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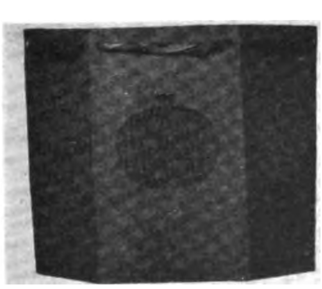
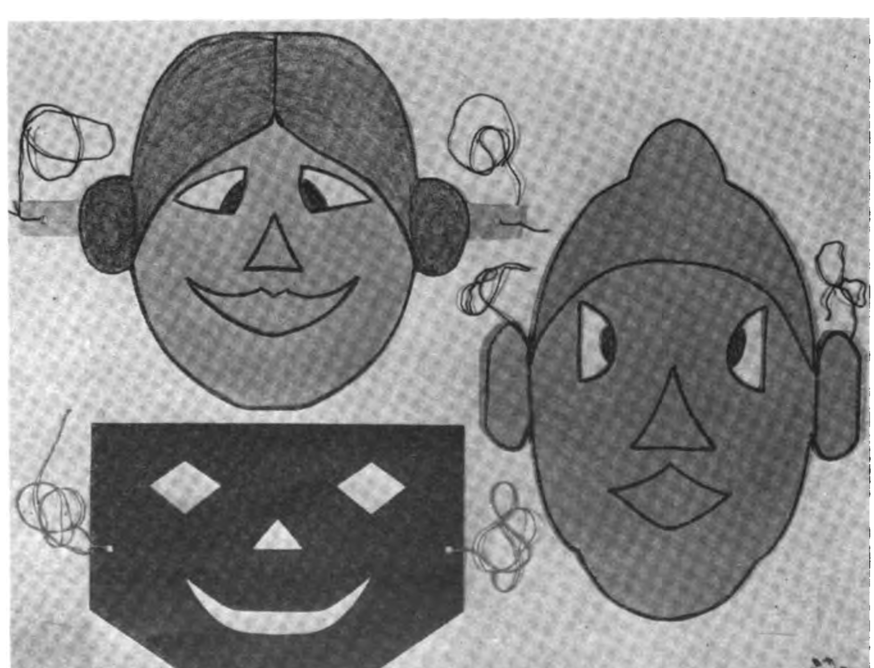


PROBLEM 9.



BELOW: PROBLEM 10. ABOVE: PROBLEM 11. RIGHT: PROBLEM 12.

FOREMANSHIP TRAINING

Beverly B. Burling, Industrial Training of Men and Boys, Milwaukee Board of Education, Extension Department, University of Wisconsin

INDUSTRIALLY it is well understood that the foreman, standing as he does on the middle ground between management and labor, largely determines the feeling of the worker on questions of a firm policy. It has been rightly said that "he is the pulse of the factory" but upon him also rests the quality and quantity of the product manufactured. The most logical means of strengthening the industrial organization and indirectly raising the standard of the product is through the foreman, realizing that an efficient system can only be maintained when there is:

1. A willing cooperation,
2. A respect between employee and manager,
3. A sense of mutual responsibility and opportunity,
4. A mutual loyalty.

In classes for foremen it is significant that the majority of members realize the importance of a careful study of the "Human Element in Industry" and so have expressed themselves in numerous questionnaires. Such courses naturally should contain, and probably be constructed around, the topics which the men feel are most necessary for greater success in their work. The spirit of cooperation should permeate such a class. Its object is to help the foreman and its success necessitates a lively interest on the part of the attendants.

The duties of a foreman may be classified under supervisional, productional and instructional. In the large factory organizations, it has been found necessary to subdivide the work for the "old foreman." Supervision has been delegated to one, production to another, and instruction to still another individual. Without doubt the time is not far distant when the number of foremen and prospective foremen, who desire to avail themselves of development courses, will be such that a more detailed subdivision of instructional material can be made along the specific lines determined by the duties of the "new foreman." It can not be expected that a course of reasonable length would cover all the phases of supervision, production and instruction any more than a course designed for one factory organization would exactly fulfill the requirements of another. For this reason the preliminary series of discussions should be designed to deal with fundamentals and lay the foundation for future courses dealing more specifically with the different classes of foremen in our shops.

Questionnaires which were received prior to the inauguration of a course in one of our nation's largest corporations indicated that the men desired a study of problems dealing with:

1. The human element in industry.
2. Production, efficiency methods, and time and motion study.
3. The foreman's job, classification of duties, etc.
4. Maintenance of equipment.
5. Handling of stock.

Numerous other topics were suggested which are largely inclusive in the above. The expansion of these topics formed the basis of probably the strongest foremanship courses offered to date, a brief outline of which follows:

The Human Side of Industry.

1. The laborer in industry.
2. The evolution of the laborer in industry.
3. The influence of the factory organization upon the laborer.
   (Place the worker, superintendent, foreman, manager, etc., in the system.)
4. Elements which retard production (if not properly considered).
   Emmigration, unions, socialism, prejudice of labor against capital, etc.
5. Conditions which retard production:
   (a) Factory (long hours, low wages, insanitary conditions, illumination).
   (b) Home (poverty, poor housing, poor food, etc.).
   (c) Leisure (bad amusements, intemperance, social evil, etc.).
6. Conditions which increase production:
   (a) Factory (fair hours, good wages, good factory conditions).
   (b) Home (good housing, refinement, food, thrift, etc.).
   (c) Leisure (education, wholesome amusement, etc.).
7. Cooperative agencies.
8. Scientific management.
   Using efficiency systems to aid worker not employer.
9. Handling men.
   Hiring and firing, foreign labor, colored labor, etc.
10. True elements of leadership.
    How to select and develop leaders.

Production: Efficiency Methods.

1. Detailed study of existing conditions. (Each student is required to make a detailed study of his own factory condition including as far as possible the items suggested and make a report of same.)
   (a) General conditions of shop-sanitation, care of equipment, scrap pile, waste of time, attitude of labor, etc.
   (b) Time keeping method.
   (c) Inspection methods.
   (d) Wage system.

2—Factors which increase production.
   (a) Good lighting, ventilation, heat, sanitary conditions, good drinking water and fan system.
   (b) Good wages and a system which will inspire greater effort.
   1. Correct time keeping systems.
   (c) Separation of male and female employees.
   (d) Elimination of waste time at machines.
   1. Placement of machinery in proper sequence.
   2. Time each machine is idle, causes.
   (a) Workman away for legitimate reasons.

(b) Break down.
(c) Failure to get material.
(d) Adjusting for next job.

(e) Elimination of workman's loss of time.
(a) Tool room location.
(b) Drinking fountain, etc., handy.
(c) False motions.
(d) Sharpening tools, etc.
(e) Failure to get material.
(f) Machine, belting, etc., being repaired.
(g) Failure to find material or tools.

(f) Elimination of waste material.
1. Inspection.
2. Proper grading and saving of legitimate refuse.
3. Proper illumination.

(g) Methods of handling material.
1. Hand.
2. Truck, hand.
3. Electric truck.
4. Crane.

(h) Planning department.

The Foreman's Job.

(Each student is required to tabulate all of his duties for careful study and analysis during course.)

Large Factories.
1. Executive.
(a) To see that the orders of the planning department are carried out.
2. Not inspection.
3. Not disciplinary.
(a) Disciplinary measures would weaken his effectiveness as an executive.
4. No clerical work.

Medium and Small Factories.
1. Executive.
(a) Assignment of work to men.
(b) Inspection.
(c) Some clerical work.
(d) Not disciplinary.
2. Production.
(a) Know each man.
(b) Study and eliminate cause of waste time of workman.
(c) Study and eliminate cause of waste material.
(d) Study and eliminate cause of shut downs of machines.
(e) Reward faithful labor.
(f) General shop conditions, equipment and stock.
3. Instruction.
(a) Eliminate carelessness.
(b) A perfect understanding of each step.
(c) An absolute adherence to the method and sequence of operations.
(d) Material to be taught.
(e) Order of presentation.
(f) Methods of presentation.

A Study of Each Man's Job.
1. Listing of duties in order of productive importance.
2. Listing of duties in order of waste or scrap importance.
3. Suggestions which would tend to increase production, reduce cost, decrease waste.
4. Detailed analysis of each step in factory production.

Handling Stock and Tools.
1. Stock.
(a) Up-to-date systems of handling stock.
(b) Inventory systems.
(c) Stock inspection.
(d) Trucking systems.
(e) Location of stock room.
2. Tool room.
(a) Tool room methods.
(b) Location of tool room.
(c) Standardizing of tools.
(d) Tool inspection.

Maintenance of Equipment.
1. The effect of maintenance of equipment upon production.
(a) Time for belt and machine repairs including oiling.
(b) Cost of idle machines.
(c) Cost of idle man power.
2. Periodic inspection of equipment.
(a) Listing of equipment and intervals between inspections.
3. Periodic overhauling of each part of equipment.
4. Safety devices.
5. Fire protection and prevention equipment.
6. Maintaining good natural and artificial light.

The question of admittance will arise upon the formation of such a class. In order "to make a good showing" or "swell the reports" many an instructor has been urged to take "all who apply." The results are evident. In some cases many have enrolled who are not foremen and those having no natural leadership qualifications soon have lost interest. In a short time the originally large class has dwindled down to a mere handful. In other cases interest has been maintained, but the apparently successful class has resulted in no constructive work. Experience has proven that none should be admitted unless he be a foreman or a skilled workman in good standing and then in numbers not to exceed fifteen. If the enrollment is allowed to exceed this danger point, the method of instruction will of necessity be changed and the efficiency of the course will be greatly reduced. Large classes have been conducted under the lecture plan, but needless to say such a method has proven far less successful in a class composed, as this is, of hard working men after a day's work and with their minds not keen for organizing material presented in lecture form.

The difficulty of "getting the men out" to a conference in the evening has been answered through the cooperative efforts of the factory management and through fees or fines, but at no time has equal success been gained as when the meetings are held at some suitable time during the day at the shop. It is impossible to conduct the classes during the working day as is so well done for apprentices in Corporation and Continuation schools, but if cafeteria facilities are available, the men can easily assemble for lunch and conference at the close of the working day once, or preferably twice, a week. It will be found that the advantages of this plan are numerous but probably the most important are the economical use of time and the assembling of men while the problems of the day (the topics for discussion) are fresh in mind. These conditions surely warrant a full class with general and lively discussion.

The selection of an instructor or discussion leader is no small matter, because the ultimate success measured in terms of permanent achievement largely depends upon the man obtained for this work. It is difficult to get good practical, trained-engineering educators without liberal remuneration, but the results will more than compensate for the expenditure. In our larger

cities available material may be obtained through the University Extension or local technical institutions. Educators generally prove the right kind of leaders, although it must be understood that a happy cooperation must exist between the leader and the management, for it will be the teacher's duty to spend some time in the shop getting acquainted with the local organization, and the general problems which are peculiar to the individual factory.

Successful courses are being given through the Extension Departments at some central location, and in summer courses at the Universities, but these do not compare in "punch" and "follow up" to the courses given in the shop. The problem of the small shop naturally must be taken care of in some center, although the results obtained cannot be as definite, in view of the fact that the classes are composed of representatives from many different industries and shop organizations.

Because of the scarcity of leaders, in comparison to the demand, the plan of training instructors would be the first step to take in any broad constructive plan involving an entire city. The personnel of this training class would not, in this case, be educators, but qualified individuals from each shop. men who have been appointed or selected to take such a course as outlined at some central location. The following term or year these men would be the leaders of classes in their respective shops. There are many advantages of this plan, more especially the fact that the trained instructors would be more thoroughly acquainted with their individual shop organizations, the men, and the "secrets" of the plant.

The qualifications which should be possessed by the instructor naturally makes it difficult to always secure for the initial class the material which will be capable of carrying on the work. It is not always the "good talker" but rather a clear thinker, an organizer with originality, and one who commands the respect of his fellow foremen who should be selected for this training class. The "talker" might hold a class, keep up the interest and appear to be doing very successful work, but a little thought will show that entertainment is not always construction. The course above all things should; first, get the foremen to think and analyze their own problems; second, apply to them the methods and principles which will increase efficiency.

Chippendale Furniture

L. G. Martin, West Henrietta, N. Y.

THE Chippendale style in furniture developed from the work of Thomas Chippendale, who was a designer and maker of furniture, pier glasses and picture frames. He specialized on frames and chairs from 1735 to 1747. In 1754 he published "The Gentlemen and Cabinet Maker's Director," a book containing designs for various types and pieces of furniture and his style became firmly established and popular. His work showed the influence of various styles, Queen Anne, Gothic, French and Chinese, and his work is sometimes classified in those divisions.

Chippendale chairs between 1750 and 1760 were very elaborate. The legs had "dolphin" feet and the backs were of the ribband back type. The chair backs were also constructed with spiral whorls at the top corners. This developed into a more graceful curve. The "cupids bow" top rail was a favorite design and also the interlacing of the back splat.

Another type of top rail was one with a carved shell ornament in the center and quite sharp curves at each side.

Between 1755 and 1760 the cabriole leg was used extensively but later the straight leg was employed. It was used plain or ornamented with fretwork. Arm chairs were constructed with the arm continuing from the back to the seat in a series of curves and also with the arm projected beyond the support and finishing in a scroll. Chippendale corner chairs were a new type. The splats were similar to the other chairs and they were quite comfortable. Linen-fold swags, acorns, and oak leaves and tassels were used as design motifs in the carving. Chairs gradually became lighter and smaller.

Dining tables were formed by placing three small tables together to form one long table in the latter part of the eighteenth century. The tables had flat tops and carved legs with paw-and-ball feet.

Small card tables generally had cabriole legs ornamented with carved leaves. The connecting stretcher was also pierced or carved. Another type had sunken corners for holding tall candles which were used at that time. Recesses were also made to hold money.

Small bureaus were popular and usually had sloping tops and drawer fronts with moulded edges which projected slightly. The bases were often veneered with figured mahogany and carved with rosettes, ribbons and gadroon mouldings.

Tripod furniture was a new feature of Chippendale's design, and many beautiful pieces were designed and made by him between 1760 and 1765. The small tripod-tables were constructed with a turned pillar in the center, generally having a bullous shape at the base, with spiral fluting. The pillar was also reeded or fluted on the upper part of some types. The table tops were made with moulded and scalloped edges which were also carved and pierced. The paw-and-ball foot was usually employed. Fretwork raised galleries were also used around the tops.

Pole screens for use before lights or fireplaces were constructed along similar lines. Acanthus leaves and cabochon were used in the carving. Candle stands and wash stands were quite common as were the adjustable reading tables in use at that time.

Chippendale designed many pieces in the Gothic style although there was little demand for Gothic furniture during the eighteenth century. One of the features of this style was the cluster column. Square legs were used extensively on chairs, and the backs were often built up with geometric patterns. Plain legs with block feet were used with this type of back. The Gothic chair backs gradually developed into a pierced splat of more refined type. Interlaced splats were made in

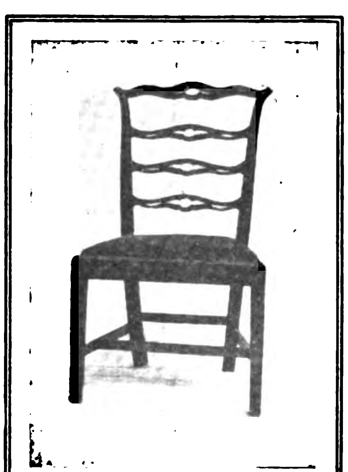
2. CHIPPENDALE CHAIR 1760-1780. A FINE CHAIR SHOWING THE GOTHIC INFLUENCE. THE TOP BACK RAIL AND FRONT LEGS ARE CARVED. THE BACK SPLAT IS PIERCED AND CARVED WITH SMALL ROSETTES. SMALL BRACKETS JOIN THE FRONT LEGS AND SEAT-FRAMING. THE UNDER-FRAMING IS PLAIN. THE CHAIR IS CONSTRUCTED OF MAHOGANY AND HAS AN UPHOLSTERED SEAT.

1. CHIPPENDALE STOOL-1760-1800 CONSTRUCTED OF MAHOGANY WITH CARVED FRETWORK ON THE LEGS AND SIDE RAILS. THE SEAT IS UPHOLSTERED AND COVERED WITH VELVET AND FINISHED WITH A NARROW BRAID AND FRINGE.

3. SIDE CHAIR, CHIPPENDALE STYLE, 1755-1760. MAHOGANY. THE FRONT LEGS ARE CARVED WITH FRETWORK AND THE STRETCHER IS PIERCED. THE TOP BACK RAIL AND SPLAT ARE CARVED WITH A LEAF ORNAMENT. THE SEAT IS PADDED.

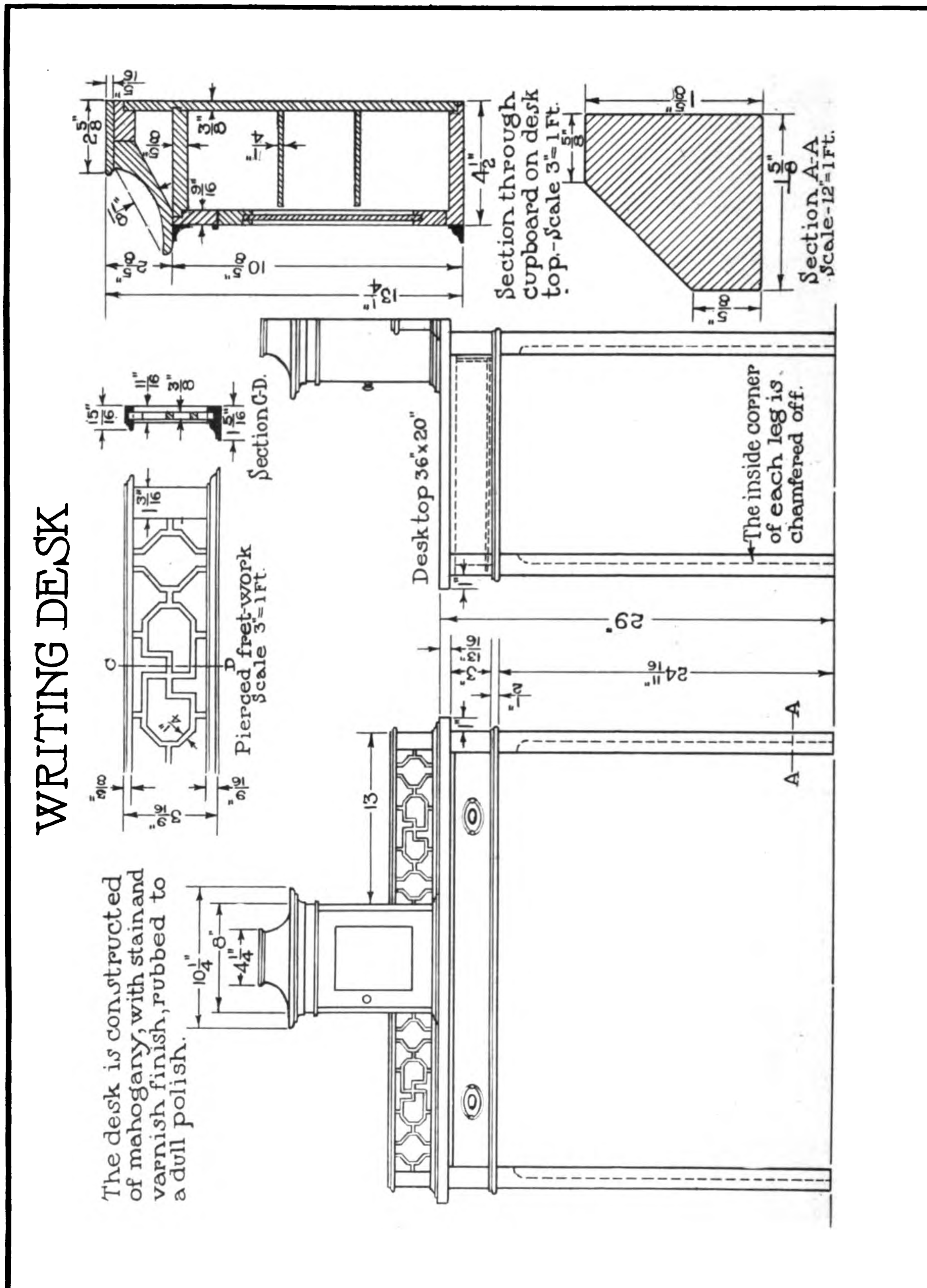
4. SIDE CHAIR, MAHOGANY, CHIPPENDALE STYLE. THIS TYPE OF CHAIR IS KNOWN AS A "LADDER-BACK," AND WAS A CREATION OF CHIPPENDALE. THE BACK HAS A VERY GRACEFUL CURVE.

5. EARLY CHIPPENDALE CHAIR. IT HAS CABRIOLE LEGS WITH BALL AND CLAW FOOT. THE SEAT FRAME HAS ROUNDED CORNERS AND THE FRAME IS SHAPED. THE BACK SPLAT IS INTERLACED.



CHIPPENDALE'S WORK SHOWED THE INFLUENCE OF DIFFERENT STYLES, QUEEN ANNE, GOTHIC, FRENCH AND CHINESE. THE "GENTLEMAN AND CABINET MAKERS DIRECTOR" WAS PUBLISHED IN THREE EDITIONS, 1754, 1759 AND 1762.

CHIPPENDALE FURNITURE

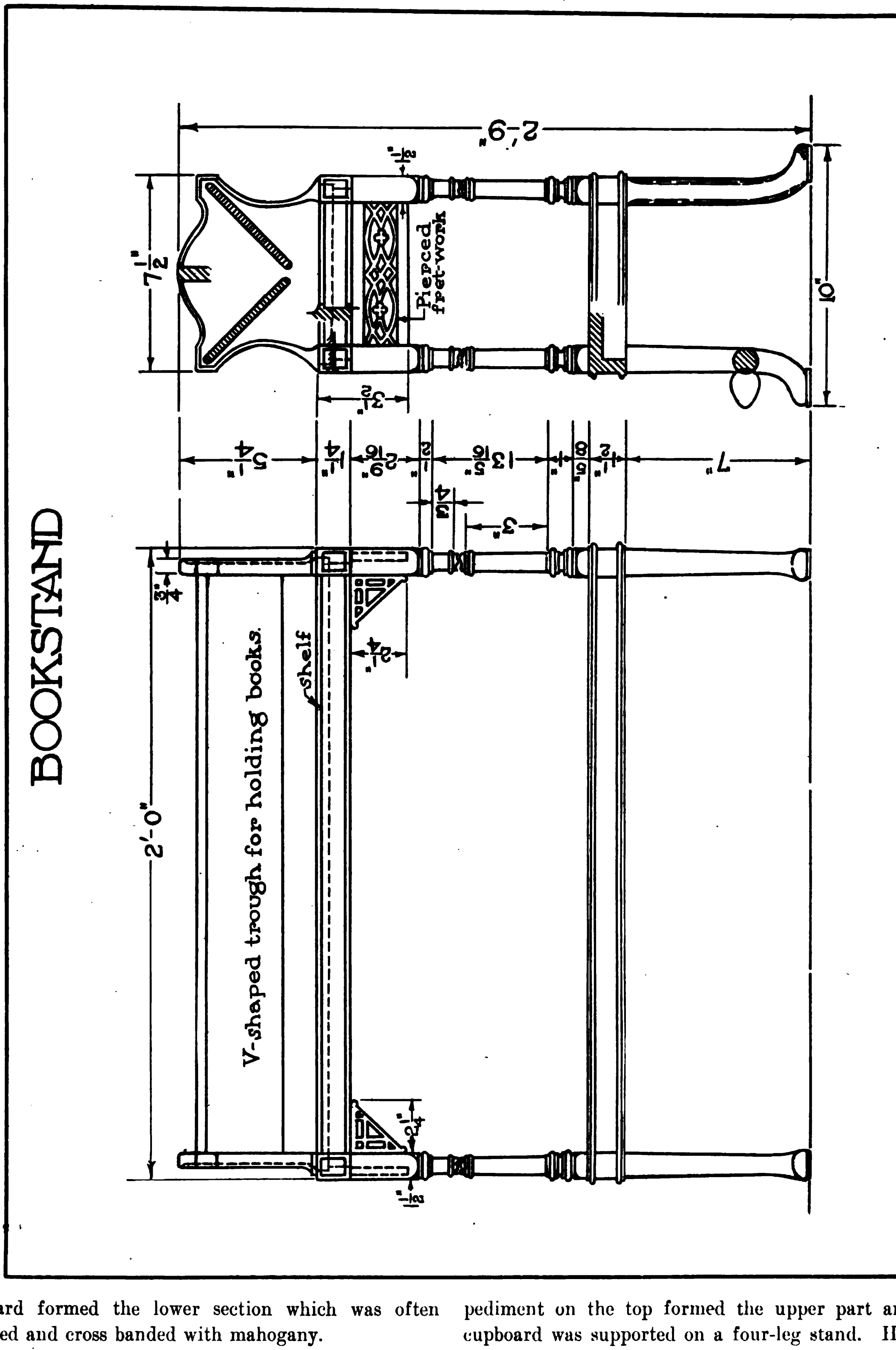


various designs. The next development of the interlaced splat was vertical piercing. The backs of some chairs were upholstered. The "drop-in" seat was most used after 1760.

Simple and ornate settees were constructed with fret-cut backs; this design was carried out on the legs and underframing as well.

The early tables had marble tops and many were built similar to desks, with a row of drawers on each side and triple cluster columns at the edges. They were also decorated with fretwork and carved pendant husks. Pierced brackets were employed to connect the legs and framing.

Small sideboards were introduced later with serpentine fronts. Fine bookcases were constructed with glass doors, inserting a tracery design in the upper part. A



cupboard formed the lower section which was often veneered and cross banded with mahogany.

Chests of drawers of fine figured mahogany were made with a writing drawer which pulled out. The drawers were usually beaded and the top and base were sometimes elaborately carved.

China cabinets were first made about 1760. A cupboard with glass doors, having a carved or scrolled pediment on the top formed the upper part and this cupboard was supported on a four-leg stand. Hanging cabinets were used previous to this period.

Chinese Chippendale furniture was very popular from 1755 to 1765 and displayed Chippendale's most advanced designs. Many pieces were ornamented with raised lacquer decorations. "Pagoda-tops" and pendant bell shapes were also features of this furniture. Lattice

work with rosettes was substituted for the splats in chair backs.

Mirrors were very costly and were elaborately carved and gilded. Beds were graceful four posters with a canopy top, with a valance and hangings at the sides.

About 1776 Chippendale worked for Robert Adam who was architect to the King of England. While the work of Robert Adam was of a classical manner, the work and influence of Chippendale was also seen. Later Chippendale adopted the French manner and his work lost some of its character. The French furniture had a lighter appearance and had fittings of gilded and chased bronze and brass.

The photographs are shown by the courtesy of The Metropolitan Museum of Art for Figs. 1, 2, 3 and the Philadelphia Art Museum for Figs. 4, 5.

A Model Steam Engine as a Shop Project

Frank Moeser, City School Department, Buffalo, N. Y.

(Concluded from October)

Connecting Rod.

The connecting rod may be made of brass, malleable iron, cast steel, or flat cold-rolled steel. If it is made from any of the first three metals, a pattern will be necessary. When this part is made of the flat cold-rolled steel, an opportunity is given the student for drill press work and some chipping, so we shall first consider the cold-rolled steel rod.

After cutting the steel to the right length, center up both ends. Draw a center line the full length of the rod and lay out holes on each side of the center as shown in the small drawing. By drilling these holes and chipping off the metal on the sides, a large amount of lathe work is saved. Care should be taken to drill each alternate hole through the rod on each side. By drilling the remaining holes, and if the rod has been laid out carefully and the holes are drilled accurately, there will not be very much trouble in removing the metal. When this extra metal has been chipped off the rod is ready for the lathe.

The operations in making a connecting rod are as follows: (1) Face off the ends to the correct length; (2) turn cross-head end to one inch diameter; (3) face crank end 1/4" thick and turn the center part to finished dimensions; (4) turn radius on cross-head end, file and polish; (5) lay out holes in both ends; (6) drill cross-head end with a 17/32" drill and ream 5/8"; (7) drill the crank end with a 13/64" drill, tap 1/4" twenty threads.

Cast Connecting Rod.

If a cast connecting rod is used there will not be so much work. It will not be necessary to center this rod so accurately because there will not be very much metal to remove. As most brass castings are very clean and smooth, all that will be necessary in the lathe is to file up the central part and polish it with emery cloth. The hole in the cross-head end of the rod can be made the same size as the cross-head pin as a bushing will not be necessary in the brass rod. The crank end will be split and fitted up in the same manner as the ends used on the flat steel rod.

If the cast steel or malleable iron is used for the rod, an allowance for finishing will be necessary on all parts of the pattern. Steel and malleable iron castings are usually very rough and should be used only when neither the brass or cold-rolled steel can be had for the rod.

Spacing Collar.

The spacing collar was used between the fly wheel and the main bearing. It was made from 1-3/8" cold-rolled steel, grasped in the chuck and the hole drilled, bored and reamed. It was then pressed on an arbor and the sides faced to the required thickness and the outside diameter turned to size. Following are the operations necessary: (1) True up in the chuck; (2) drill, bore and ream a hole; (3) press on the arbor and face the sides and the outside diameter.

Fly Wheel.

The first operation on the fly wheel was to chuck it up true and turn the outside. The diameter of the wheel was not an essential point. All that was required of the boys was to obtain a smooth and straight finish. The side was faced next and the hole was drilled with a 9/16" drill. A small boring bar was used to true up the hole after which it was reamed with a 5/8" reamer.

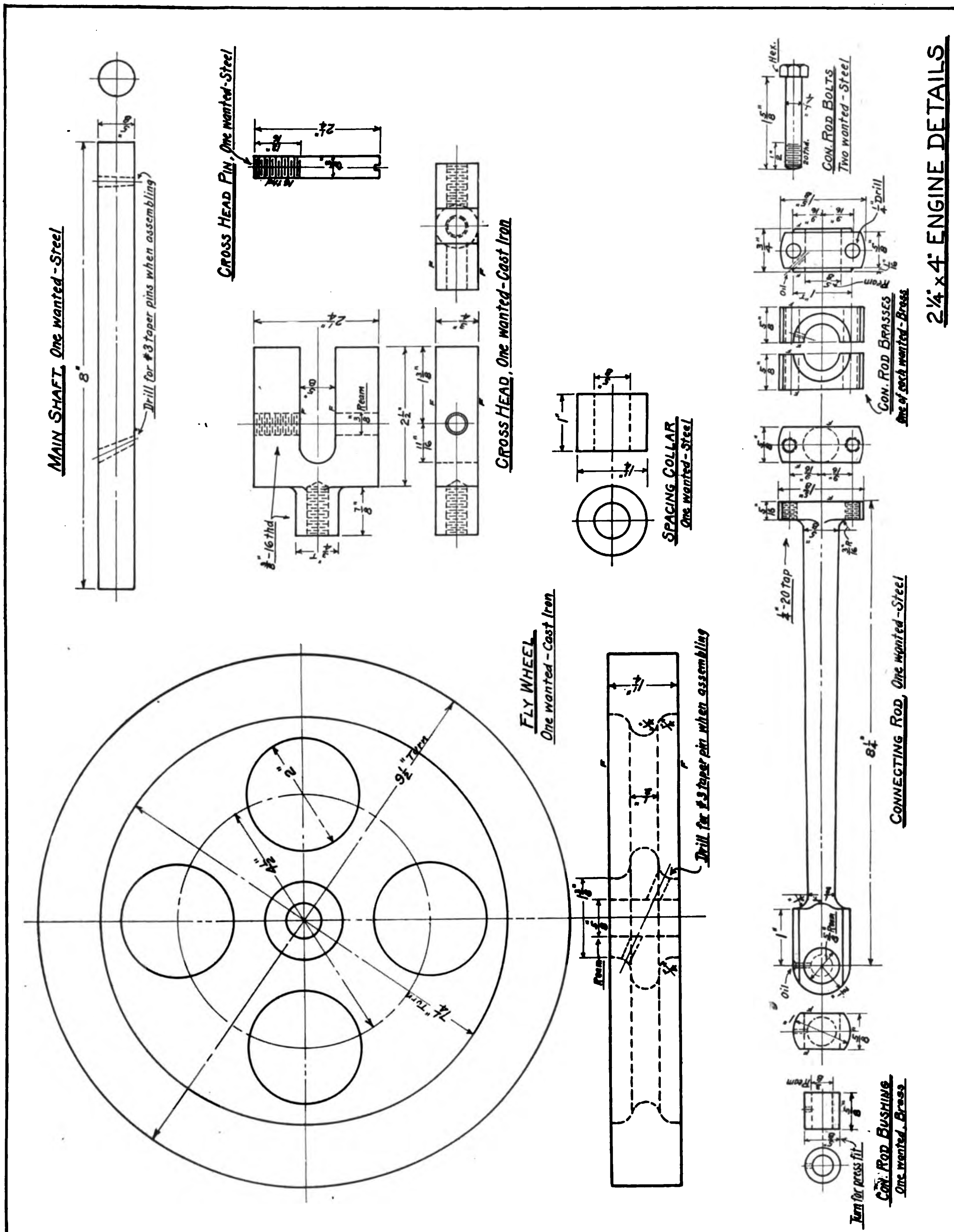
For finishing the opposite side of the wheel, a plug, as shown in Fig. 5, was inserted in the spindle of the lathe and the face plate was screwed onto the spindle. This method was used because the hole in the wheel was so small that if an arbor had been used, a satisfactory finish could not be obtained due to the spring or chattering.

The operations for the fly wheel are: (1) Chuck up true; (2) turn the outside diameter; (3) face the side; (4) drill, bore and ream a hole; (5) face the opposite side; (6) file and polish.

Connecting-Rod Bushings.

The connecting-rod bushing was made from a piece of 3/4" brass. It was first chucked up true in the lathe chuck and a 5/16" hole was drilled to the proper depth. A small boring bar was used to true up the hole and it was reamed out with a 3/8" reamer.

The outside diameter was turned to size and the bushing was cut off and pressed into the rod. After pressing the bushing into the rod, a 3/8" hand reamer was used to ream out the hole and remove burrs and projections which had arisen when pressing the bushing into place.

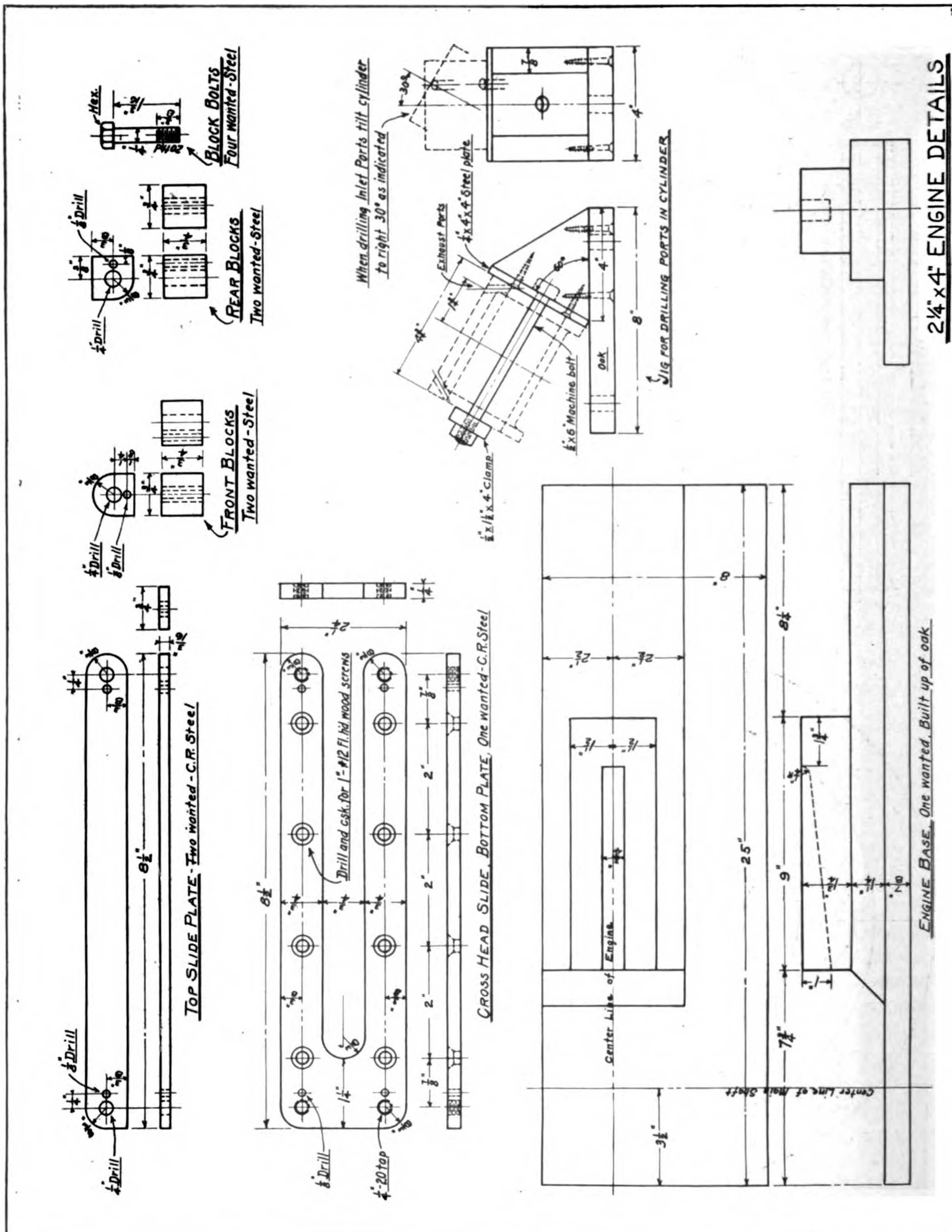


The following operations are necessary in making connecting-rod bushings: (1) Chuck up true in the lathe chuck; (2) drill, bore and ream a hole; (3) turn outside diameter and cut off; (4) press into the rod; (5) ream the hole with a hand reamer.

Connecting-Rod Brasses.

The brasses or end bearings for the connecting rod were cut from a bar of 5/8" x 3/4" flat brass. The first operation was to lay out the 1/4" holes for fastening to the connecting rod. Two bolts were used for fastening the end pieces together and the 5/8" hole for the crank pin was laid out exactly in the center of the two blocks. (See detail drawing.)

A 1/8" hole was drilled through first, followed by a 17/32" drill and a 5/8" reamer. By using the small drill first and following through with the larger, a more accurate job was obtained. After the hole was drilled and reamed, the end pieces were pressed upon an arbor



and the sides relieved as shown in the detail drawings. The arbor was pressed out of the hole and a small oil hole was drilled through one of the brasses. All that remained to be done was to screw them into place on the rod and file the top and bottom of the brasses to the same shape as the end of the rod.

The operations are as follows: (1) Cut off two pieces 1-5/8" long; (2) drill 1/4" bolt holes; (3) lay out. drill and ream a 5/8" hole; (4) press on the arbor to relieve the sides; (5) drill the oil holes; (6) bolt it into place and file to shape.

Main Shaft.

For the crank shaft of the engine we used common 5/8" cold-rolled steel. A turned shaft would be more desirable but, inasmuch as we were limited in our machine equipment, we did not attempt to turn the shaft from larger stock. If the equipment is available the turned shaft would be used.

Piston Rod.

The piston rod was made from 7/8" cold-rolled steel. The first operation was to center up both ends and to rough turn all dimensions 1/16" larger than required. After all roughing has been done, finish turn the cross-head end and cut the threads.

For finishing the piston end, two nuts should be placed on the cross-head end and locked together. By placing the dog on these two nuts, marring of the threads or other finished part of the work will be avoided.

The necessary operations are: (1) Cut off 7/8" steel 7-1/2" long; (2) center both ends; (3) rough turn over all; (4) finish cross-head end and cut the threads; (5) finish the piston end and cut the threads.

Cross-Head Pin.

This pin can be made up in either of two ways. One way is to center both ends and finish the pin between the centers of the lathe in the same way that the piston rod was finished. The objection to making the pin in this way is that the center hole in the end may interfere in obtaining a good screw slot. The other method is to take a long piece of 1/2" or 7/16" steel and true it up in the chuck, allowing enough to extend past the chuck jaws to enable the parting tool to work properly. It will be necessary to center the end which extends out of the chuck, for the greater distance between the chuck and the tool, the greater will be the spring in the work. By centering this end and screwing in the tail center the shaft will be more steady and a better cut can be taken over the work.

The steps in making a cross-head pin are: (1) Rough turn; (2) finish turn; (3) cut threads; (4) file and polish; (5) cut off.

Complete Cross Head Slide.

The bottom part of the cross-head slide was cut from a bar of flat, cold-rolled steel. The first operation was to cut out the slot in the center to provide for clearance for the connecting rod. To do this we scribed a line through the center and laid out 5/8" holes on 9/16" centers, or we allowed 9/16" from the center of one hole to the center of the next; then drilled a small hole through these centers and followed with a 5/8" drill. By laying out and drilling in this manner we avoided a large amount of unnecessary sawing and chipping.

The screw holes were laid out, drilled and countersunk, and the holes in the ends were drilled and tapped. The sides of the slot were filed smooth, and the ends were rough ground.

The top parts of the slide were cut from a 3/16" x 3/4" cold-rolled steel bar, and the end holes were drilled with a 1/4" drill. The spacing blocks were cut from a 3/4" square bar of cold-rolled steel and the ends were filed square with the sides. The 1/4" holes were laid out and drilled through the center of each block.

The entire slide was then assembled and the small 1/8" holes were drilled through the top, spacing block and bottom. The pins were driven in place and the ends were rough ground on the emery wheel, then finished smooth with a file and emery cloth. The bottom part of the slide was screwed in place in the base of the engine and then draw filed smooth and scraped. The top plates and spacing blocks were again replaced until the entire engine was ready for assembling.

Cross Head.

The cross head should have been finished on a shaper or a milling machine, but by rigging up the face plate of the lathe, as shown in the accompanying sketch, we finished the job nicely.

The first operation is to center both ends with a center drill. Next, place it between the centers of the lathe and turn the piston rod end to 3/4" diameter and to the required length. Place the cross head between the centers on the face plate and, after securing it in place, face one side down to the diameter of the piston rod end. Now reverse the cross head and finish the other side.

Some difficulty may be experienced in facing both sides parallel, but if a light cut is taken when finishing the last side and a caliper is used to measure the difference in the thickness of the sides, the adjusting screws can be manipulated to minimize any difficulty.

When both sides were finished to the required thickness, the cross head was removed from the lathe and a 5/8" hole was drilled through the center. The remaining metal from the end of the head to the 5/8" hole was cut out with a hack saw and the sides were filed smooth to the required width. The holes for the piston rod and for the cross-head pin were then drilled and tapped.

The necessary operations for the cross head are: (1) Center the ends in the drill press; (2) turn the piston rod end to 3/4" diameter; (3) place in the fixture on the lathe and face one side; (4) reverse the head and face to size; (5) drill 5/8" hole, saw, file and finish the slot for the connecting rod; (6) drill and tap holes for the piston rod and for the cross-head pin.

Base.

The base of the engine was made from 7/8" red oak. This was the best material available and as we had no machine capable of machining a casting of this length a cast-iron base was out of the question. The wood was cut to the required lengths, glued and screwed together. The part for the cross-head slide was bolted onto the other two pieces with four 1/4" bolts.

Assembling.

As has been stated before, different parts of the engine were assembled by the boys while they were awaiting their turn on the machines. For example, the base of the engine was the first part to be completed by most of the boys. After all of the machine work had been finished on the cylinder and heads, these parts were assembled and their location determined on the base.

The cross-head slide was screwed into place and when the cross-head and piston rod had been completed these parts were assembled and fitted up to run smoothly back and forth in the way in which they

would run. All of the other assembly work was carried forth in this manner until the entire engine was completed.

To say that this was an interesting project for the boys would be putting it rather mildly. The entire school year was devoted to the building of these engines and if some of the readers could see the boys while they were working and hear some of the comments out of school, there would be no doubt in anybody's mind that this was a real, live, interesting job.

A Neglected Phase of Vocational Guidance

D. J. MacDonald, Professor of Vocational Education,
University of Cincinnati

DURING the past year the writer was engaged with others in a thorough survey of the vocational guidance movement. In view of the fact that again and again we came face to face with the question as to the specific occupations into which juvenile workers go, it seems justifiable to consider this point at length.

A comprehensive program of vocational guidance ordinarily comprises cumulative school records, intelligence quotients, information relative to social environment, ancestral background, etc., and the employment record of the juvenile, in case he has had employment. With this program—so far as it goes—no one can find fault. But when the vocational guidance officer faces the real problem of advising young persons regarding employment, or even regarding future educational courses, the writer fails to see how such advice can be intelligent in character, unless this officer has a rather thorough knowledge of the specific occupations which are open to such young persons, regardless of whether they leave school at once or remain in school indefinitely. Wide spread investigation of this point revealed very little reliable information.

Lack of such information lessens the effectiveness of vocational guidance in yet another way. Not long since the writer was in conversation with a grammar school principal who had recently conducted a survey of the industries in his school district, and upon the strength of this survey, was establishing prevocational classes in printing, sheet metal work, electrical work, and carpentry in his school. His response to my query as to whether he had any reason for believing that the pupils from his school were entering the industries for which he was establishing classes, was negative and when I suggested that, in my judgment, it would be very desirable for every principal to have on file in his office the employment history, at least of a majority of his pupils, for the three or five years following termination of their school life, he agreed. Being a man of ready action, he instituted an investigation of this character soon thereafter. When I saw him some weeks later, his first remark was to the effect that his investigation showed that approximately one-half of his boys and girls were going into clerical work, and that as a result of this information, he intended to establish, if possible, commercial classes. I have a suspicion that the kind of commercial work introduced in his school was traditional in character and that as a result, if he had followed up the pupils who took this work, he would have found-- as was found by the people who are responsible for the "Survey of Junior Commercial Occupations," published by the Federal Board for Vocational Guidance-- that relatively few young persons under 18 years of age, at least in cities in which the surveys were conducted, are using in the offices the training received in school.

An interesting sidelight of similar character, is found in the recent report on juvenile employment in New York City, the essentials of which are:"Stenographers and typists under 17 or 18 years of age are a drug on the market. Applicants for this class of positions, under this age, especially where they have not had the equivalent of a high school education, even though they show graduation from a school where they have specialized in these subjects, have the greatest difficulty in getting such employment at any price. The proportion of such applicants who fail to secure openings in the work for which they have been trained is shown to be in the Brooklyn office 67 per cent, in the two Manhattan offices 80 percent and 86 percent respectively. It is possible, to be sure, that the present industrial depression is an important factor in this situation. It is also possible that the same conditions would not be found to prevail outside of these cities. The first statement, if true, reminds us most forcibly of the fact that the schools, as well as other social institutions are immediately susceptible to industrial depressions and that, therefore, one might not be justified in basing deductions upon the employment figures for any one-year or three-year period. The second should serve as a warning to any one who is inclined to be satisfied with figures of this character quoted by another city. The only kind of statistics which may be safely used in any locality are those which tell the story in that locality.

Do not both of these citations go to prove the necessity of having specific information not only regarding occupations into which juveniles of the different ages go, but as well of the definite requirements of those occupations? How can a school officer safely recommend the establishment of prevocational, or even vocational courses, in his school, unless he knows rather

well whether or not pupils who take these courses are likely to find employment which will permit the training received to function. If he does not know this--a state of affairs which, sad to relate, is more often than not true--then he cannot be said to be acting either in the interests of the community or of his pupils. In fact, the necessity of securing information of this character, regarding his former pupils, is apparent even after he has established vocational classes. There is no other way for him to know how fully his school is meeting the needs of his pupils and the community.

Apropos to this is the well known experience of those who were responsible for the establishment of our technical high schools and their immediate predecessors, the private mechanical institutes. As is well known, their advocates firmly believed that by establishing such schools, they would thereby immediately swell the number of first-class mechanics, skilled men who could and would work at machine and bench. But a comparatively recent investigation showed that less than three per cent of the graduates of such schools are found after five years among the ranks of mechanics; rather that they are occupying, almost without exception, executive positions. It remains to be seen whether the same thing is happening regarding our present prevocational and vocational courses. Assuredly, we should not go on assuming, as did the above referred to individuals, that certain things are happening when they are not. Why not get hold of the information, the employment records, if you please, of at least a large majority of the boys and girls who leave our schools each year and ascertain without a shadow of a doubt what those boys and girls are doing? A notable instance of the kind of information needed, though it should be more elaborate in character, is that found in a recent report of the Children's Bureau of the United States Department of Labor on "Industrial Instability of Child Workers." Surely, until we secure such data, we have no right to lay claim to scientific procedure, either in the vocational or the educational fields.

Art-Fiber: A New Material for the School Shop

H. H. Harrison, Director of Manual Training, Marshall Public Schools, Marshall, Mich.

SINCE wood has soared to the present high prices, it is indeed fortunate that of late the tendency is to use other materials in conjunction with wood, or in place of it, in many shop classes. Materials such as cane, splints, rattan, leather, cretons, etc., have helped much, but now we have an entirely new material which is very different and yet combines readily with the others.

This new material is a twisted paper called "Art-Fibre" which closely resembles reed or rattan. It can be bought in several different sizes and two colors "Natural" white and "Kraft" brown. The cord, for weaving, is soft and pliable, while the stakes for spokes, are stiff with a wire center. It has the advantage of always being in a working condition and not requiring soaking in water. Art-Fibre can be recommended for everything for which reed and rattan are adapted and also many other projects.

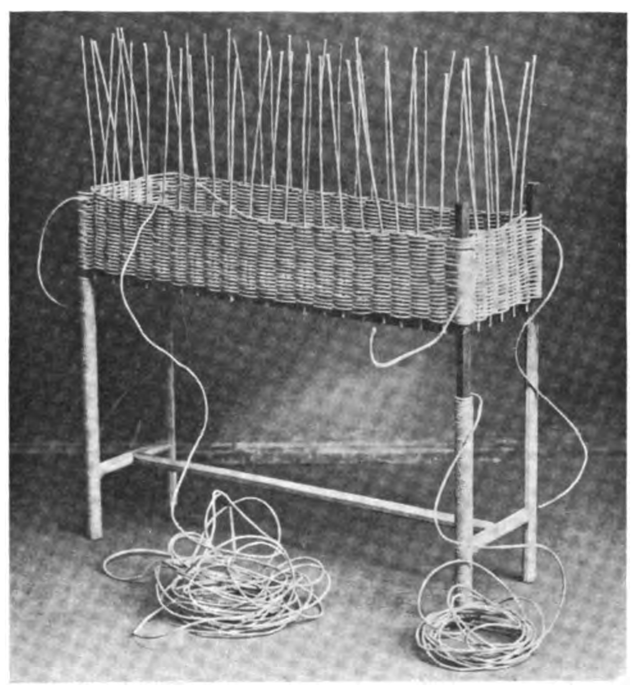


FIG. 3.—WEAVING THE BODY, FILLING IN THE POSTS AND WRAPPING THE LEGS.

FIG. 4.—FERNERY COMPLETED.

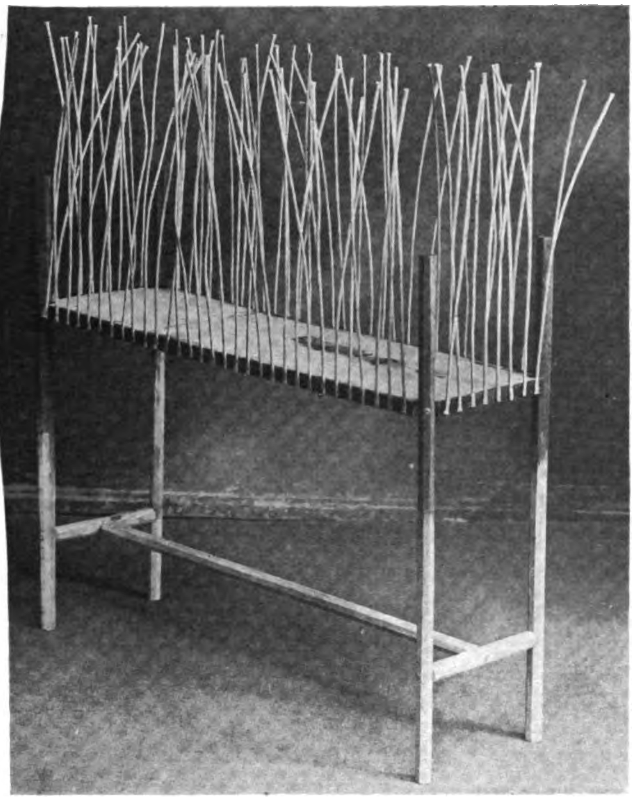


FIG. 2.—THE FRAME. STAINED AND WITH THE STAKES IN PLACE.

The title says, "New Material," but really it is not entirely new as the writer has been using it for several years and such men as Edward F. Worst, Supervisor of Elementary Manual Training and Construction Work, Chicago Public Schools, Chicago, Ill.; Harry E. Wood, Director of Manual Training, Indianapolis Public Schools; James H. Smith, Supervisor of the Principal's Course, Whitewater State Normal School, Whitewater, Wis.; and others have written articles dealing with paper cord. Still it is a material that is little used and it is with the hope that some instructors not now acquainted with it will soon find it a great help, that the following article is submitted.

The equipment necessary to do the work is very simple and everything needed with be found in the average school shop. In fact, a shop is not essential at all in a large part of this work. A few necessary tools and materials are: hammer, tin snips, round nose pliers, brace, bits, nail sets, spikes, nails ¾" No. 18 and varnish or shellac.

The price of Art-Fibre is very moderate, so that the cost of the articles in Fig. 1 are as follows: fernery $1.00, stool top 50c, tray 35c, and the piano lamp (shade included) $1.50.

The field of work with this material is very large, varying from a small mat to a large upholstered chair. Many writers have articles or parts of books dealing with projects in the construction of which this material may be used and where those interested may find help, therefore this article will give but a few details.

Fig. 1 shows a group of Art-Fibre projects made in the author's classes. It will be noticed that such projects as baskets, mats, vases, etc., are lacking; this is because the articles shown were made by High School boys, while the mat and basket weaving is given by another instructor to boys of a lower grade.

THE FERNERY.

The fernery, Fig. 4, is one of the most popular projects among the boys and one of the most simple to construct. It has been varied as to shape and size many times and the lower cross pieces changed or a fancy design added between the legs, but always it has proved successful. In general the procedure is as follows:

A. *Frame.* Rigidity is the big essential, so oak was used for the legs and cross pieces, white pine for the bottom, and 2" No. 10 screws for fastening. The oak was inch material and after it was cut to length it was ripped one inch square and then octagon. The octagon shape helps grip the paper cord in winding but still gives a round appearance. The white pine bottom was made of inch material and notched at the corners to receive the legs which were screwed on with the screws entering cornerwise. This helped to make it rigid. Fig. 2 shows clearly how these were assembled. Staining as shown in the same figure will help hide any breaks in the Art-Fibre which would otherwise show white when the finish darkens the paper.

B. *Body.* In building up the body, 5/32" Wire Stakes were used and tacked on the frame as in Fig. 2. The stakes next to the posts were only ½" from them while all the rest were about 1½" apart. Any book on reed or rattan work will give several methods of weaving-in the body, but the method used here dealt with

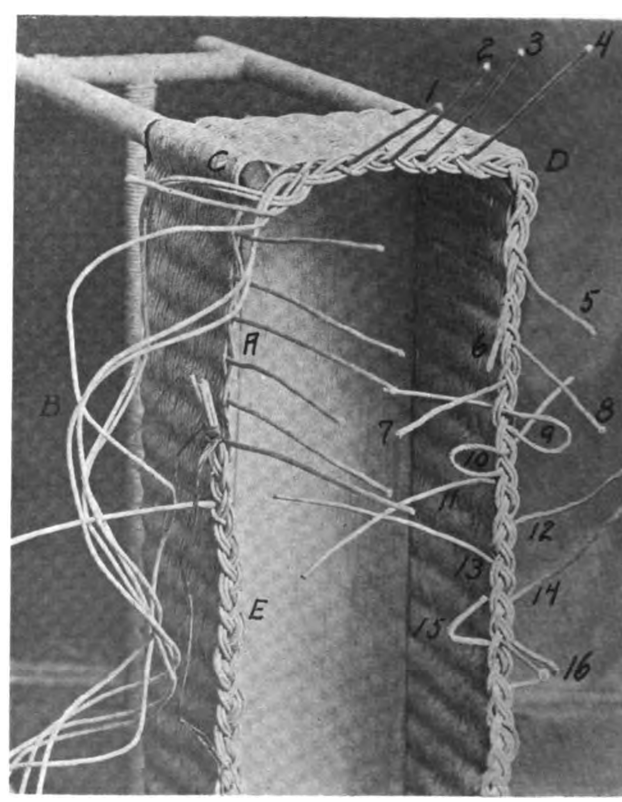
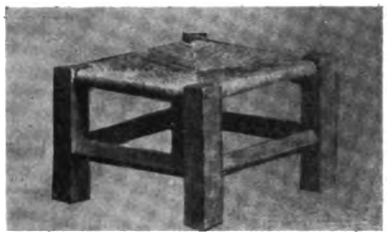


FIG. 5.—WEAVING THE BRAID.



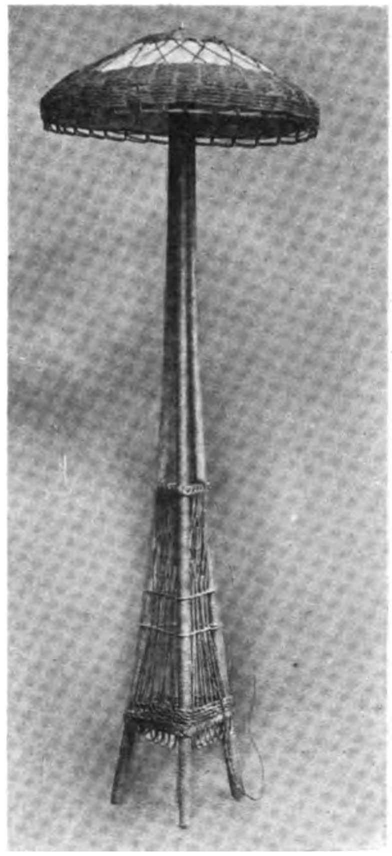


FIG. 1.—SOME ART FIBRE PROJECTS MADE IN MARSHALL HIGH SCHOOL.

the single weaver calling for an odd number of stakes. The corners or posts were filled in by introducing the extra pieces at each corner, and with them wrapping in the spaces left by the weaver in passing around the posts.

C. *Legs.* In wrapping the legs the material as in Fig. 3 is tacked at the bottom of each leg, tightly wrapped and then tacked again at the top. Next wrap the short cross pieces and lastly the long one. This same illustration shows clearly the method of wrapping the joints.

D. *Braid.* The braid around the bottom board is made up of six pieces of cord each as long as one and one-half times the distance around it. This braid is woven off the fernery and then tacked on as shown in Fig. 4. If care is taken, the ends may be tacked in place so as to be completely invisible. In all the tacking on of the braid use a nail set and hide the nails as much as possible.

The top braid is really the most difficult part of this project to make. Many books give several different ways of putting on a braid or finished edge but the author thinks the method here shown is the most satisfactory as it hides the corner posts better than many others. Fig. 5 shows this method which is as follows: Five pieces of Art-Fibre B, each as long as one and one-half times around the top, are braided together. A shows the stakes ready to receive the braid. Stakes 1, 2, and 3, show the wrong placing of the stakes through the braid and 4, 5, 6, 7, and 8 the correct. Notice that only the single strand should pass around the standing stake. When a corner is reached C, one of the stakes is taken up and braided with the five strands until the next stake around the corner is reached. The braid should then be nailed to the corner post. D shows the finished corner. This still leaves the stakes between the posts standing. Stakes 9 and 10 illustrate clearly the next step in weaving them into the braid. Stakes 11, 12, 13, and 14 have been pulled snug. The last step is shown by stakes 15 and 16 which are cut off and bent so that the end of stake 16 will slip in where the nail is. This leaves a smooth top and is also very solid as about three inches of stake 16 will lie next to a stake in the woven body. E shows the finished braid. When the braid reaches all the way around, the long ends are cut off and braided together making it endless.

E. *Finish.* There are several different ways of finishing the projects. The shade may be varied by using a stain, but the writer has been more successful with a dark or colored varnish. The Art-Fibre should be given a thin coat of glue sizing after the project has been finished and before any finishing materials are applied. This sizing stiffens the material and makes it impervious to water and at the same time gives it a proper surface for finishing. A very little glue sizing will hold the finish on the surface and thereby save a large expense as only one coat of varnish or shellac will be necessary. A cheap grade of ground animal glue made thin enough to easily apply with a brush and so it will run off quickly, will give a smooth hard surface. It is better to work it too thin at the start, giving it two coats of glue if necessary, rather than get it too thick. Most of our ferneries have been finished this way and the result has been a brown color with a high gloss which is very pretty and harmonizes well with the plants.

The plants may be placed in the fernery in pots or a tin container made, to fit the fernery, and this filled with dirt.

Bill of materials for the fernery:

Bottom board. 1 piece white pine 1"x10"x32".

Legs. 4 pieces oak, octagon in shape, 1" between faces, 28" long.

Cross pieces. Same as legs, 2 pieces 8" long, 1 piece 26" long.

Art-Fibre. 4½ pounds including 47 stakes 18" long.

Finish. Glue sizing, 1 coat varnish or shellac.

Container. Galvanized tin box.

THE PIANO LAMP.

The piano lamp as shown in Fig. 1 was suggested to the author by a similar lamp, in the local furniture store window, which was priced at $25.00. This one cost about $7.00.

The frame is composed of three pieces of oak, cut octagon, 1" between faces and 6' long. These were steamed and bent into the curve shown, braced with two triangular cross pieces and then fastened together at the top. A hole was made through the top and both cross pieces for the electric cord.

The legs were first wrapped as in the fernery, then fastened together, the fancy design tacked on and lastly a braid was nailed around the cross pieces.

Directions for shade making may be easily obtained. Cretons and silks make harmonious linings.

THE FOOT STOOL.

The foot stool, Fig. 1, shows a different phase of the Art-Fibre work. The top is a good imitation of the old rush seating and may be made rectangular if so desired. As a substitute for rush in renewing seats in chairs, it is very successful. For full directions see "Problems in Woodwork" by Edward F. Worst.

THE TRAY.

The tray shown in Fig. 1 is only one of many beautiful designs which can be easily worked out. Besides its beauty, it has the advantage of being light. "Industrial Work for the Middle Grades" by Edward F. Worst, shows several fine shapes and borders.

OTHER PROJECTS.

The articles shown are but a few of the many projects for the construction of which Art-Fibre is adaptable. The frames for table lamps, tea wagons, lemonade trays, etc., may be bought from Louis Stoughton Drake, Inc., 38 Everett St., Allston, Mass. The method of constructing baskets, mats, napkin rings, etc., may be found in: "How to Make Baskets," "More Baskets and How to Make Them," both by Mary White, published by Doubleday, Page & Co., New York City.

Home Made Machinery

C. W. Frost, Philipsburg, Mont.

(Second Article)

THE Jig Saw is designed for use in heavy stock where it is impossible to use a band saw; for cutting out marqueterie patterns and art metal work; and for the use of pupils whom it is deemed inadvisable to trust with the band saw.

The saw frame and clamps will hold any kind of saw blade between four and eight inches in length, from the finest "jewelers'" saws to a quarter inch power jig-saw blade, including the common loop and pin end coping saw blades, and jewelers' hack saw blades.

The crank shaft is provided with threaded screw holes at different distances from the center of the shaft, by means of which the length of saw stroke can be regulated, from half an inch for marqueterie and art metal work, to an inch and a half for cutting heavy stock such as drawer openings in table rails, etc.

The drawings of the jig saw show but one diameter of pulley, but that used in this school is belted to the shaft of the combination disk and spindle sander, which machine is provided with double step pulleys for varying its speed to produce the best results with both spindles and disks. Th jig-saw operator has, therefore, the choice of two speeds by merely shifting the drive belt on the sander. The same results can be obtained by including a counter shaft in the frame of the jig saw.

The sander used in this school is arranged to make 557 R. P. M. with the low speed used with the disk, and 1470 R. P. M. with the high speed required to do the best work with the spindles. The jig-saw drive pulley

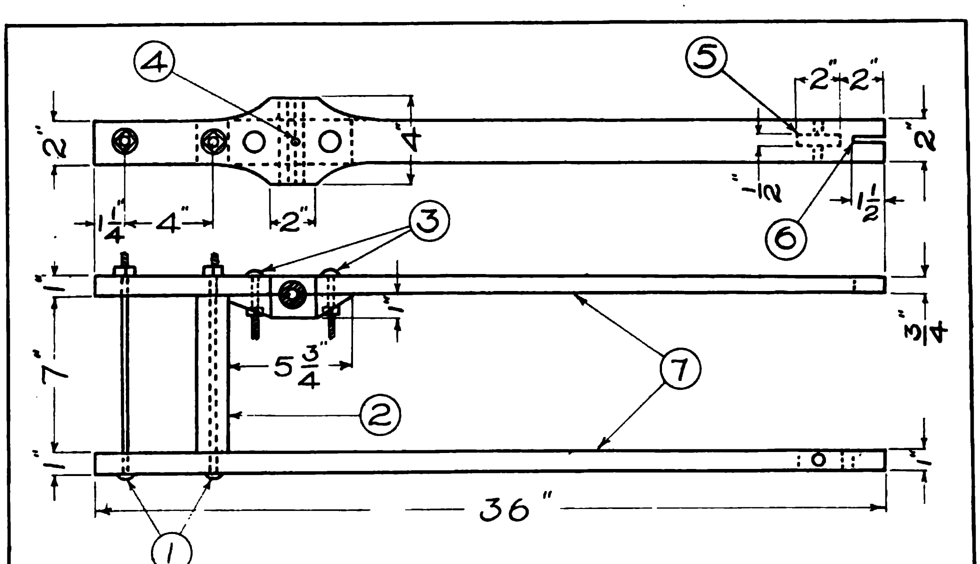
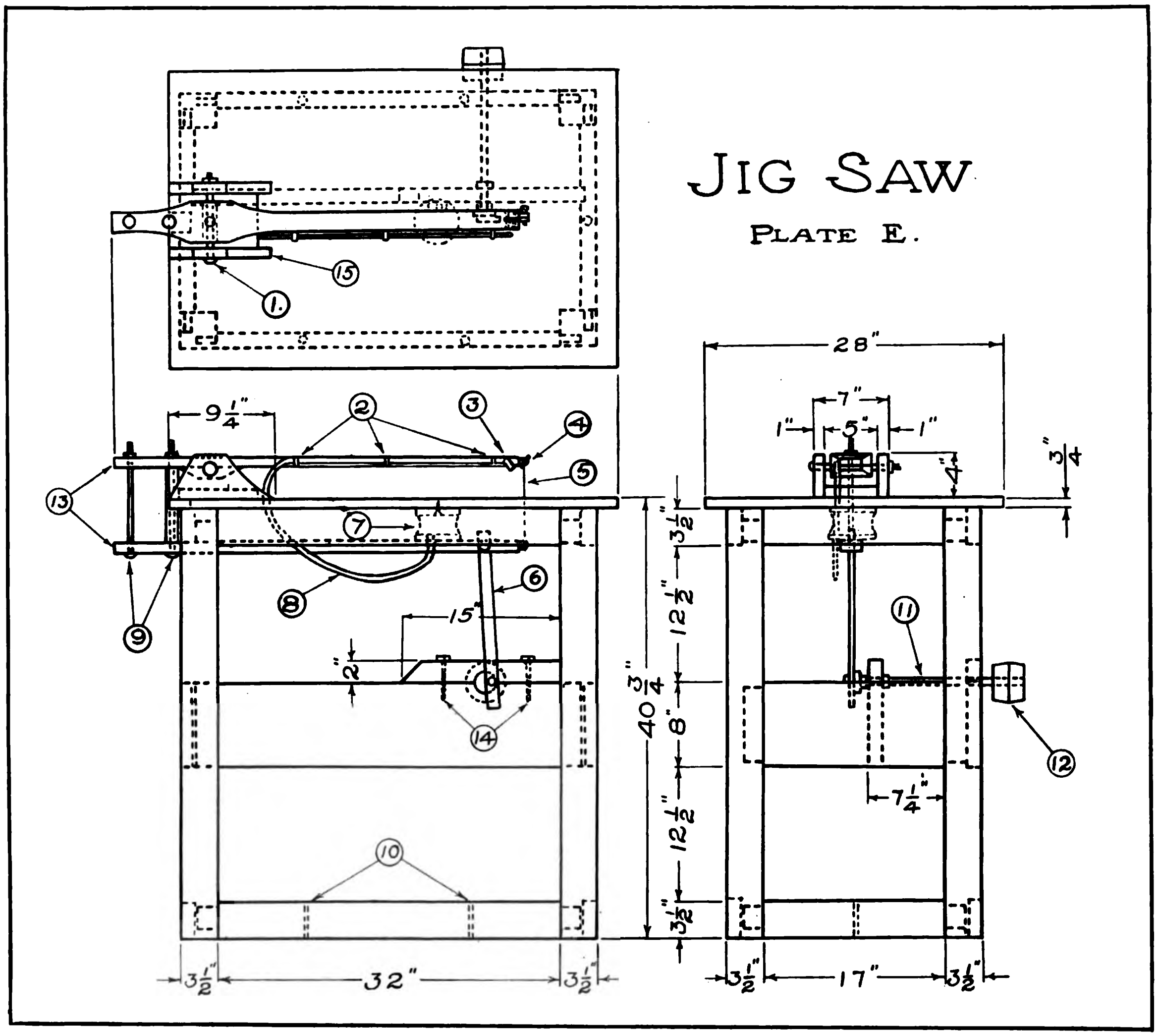


PLATE F.


JIG SAW
PLATE E.
28"
7"
1"
5"
1"
9 1/4"
32"
3 1/2
40 3/4
12 1/2
8"
15"
2"
17"
7 1/4"
3/4"
4"

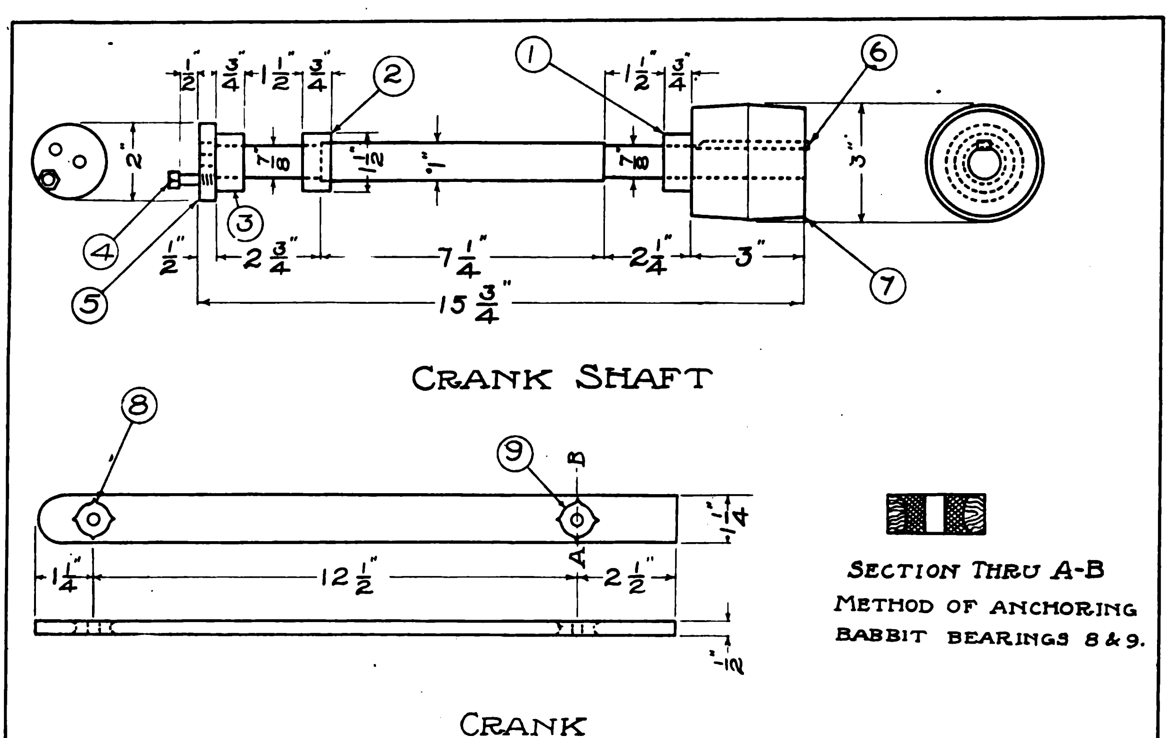

CRANK SHAFT
2"
7/8
1 1/2
1"
3"
2 3/4
7 1/4"
2 1/4"
15 3/4"
1 1/4"
12 1/2"
2 1/2"
1/2"
A
B
SECTION THRU A-B
METHOD OF ANCHORING BABBIT BEARINGS 8 & 9.
CRANK

PLATE G.

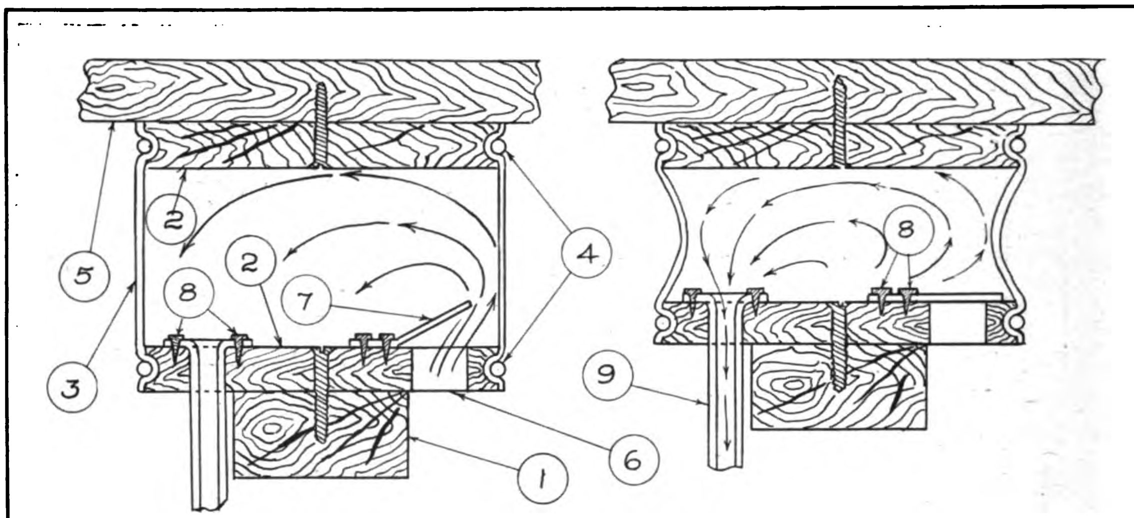


PLATE H.

on the sander shaft is two inches in diameter, that on the crank shaft is three inches, therefore the jig saw makes 371 strokes per minute on the low speed, and 980 on the high speed. Probably it would be an advantage to provide the machine with two additional speeds; one for metal work of about two hundred strokes per minute, and another, for heavy work with wide blades, of about twelve hundred strokes per minute. This could readily be done with either a counter shaft, or drive from the sander shaft.

A blower to keep the surface of the work in front on the saw free from dust is an essential part of any power driven jig saw. That shown in the drawings is of the simplest form, and works quite satisfactorily. The diameter of the wooden disks forming the top and bottom can be varied to fit any size of inner tube available.

Parts of the Jig Saw.

Plate E.

1. Saw frame axle (carriage bolt ¼" x 8").
2. Screw eyes holding blower tube to saw frame.
3. Blower nozzle (¼" auto oil feed pipe).
4. Upper saw clamp.
5. Saw blade.
6. Crank.
7. Blower.
8. Blower tube (¼" rubber tube).
9. Tension screws (¼" x 8" carriage bolts).
10. Holes for lag screws to fasten machine to floor.
11. Crank shaft.
12. Pulley.
13. Saw frame.
14. Lag screws (¼" x 3").
15. Cap to bearings.
16. Lower saw clamp.

Plate F.

1. Tension screws (carriage bolts ¼" x 8").
2. Tension block.
3. Carriage bolts (¼" x 3").
4. Oil hole.
5. Slot for crank.
6. Slot for saw clamp tang.
7. Saw frame arms.
8. Babbit bearings.
9. Hole for crank axle.

Plate G.

1.–3. Babbitt collars.
4. Crank axle.
5. Eccentric disk.
6. Key.
7. Pulley.
8.–9. Babbitt bearings.

Plate H.

1. Lower arm of saw frame.
2. Wooden disks, top and bottom of blower.
3. Section of inner tube.
4. Wire belt lace binder.
5. Saw table.
6. Air intake hole.
7. Valve.
8. Tacks.
9. Air outlet tube.

Material for Jig Saw.

4 pieces pine 4x4x40—18 ft. B. M. @ $100 M	$1.80
4 pieces pine 2x4x36—10½ ft. B. M. @ $75.00	.79
2 pieces pine 2x10x36—10 ft. B. M. @ $75 M	.75
2 pieces pine 2x10x24—7 ft. B. M. @ $75 M	.53
1 piece pine 1x28x42—9 ft. B. M. @ $75 M	.67
2 pieces pine 2x2x15—1 ft. B. M. @ $75 M	.08
1 piece oak 1x4x36—1 ft. B. M. @ $350 M	.35
1 piece oak 1x2x36—½ ft. B. M. @ $350 M	.18
I piece walnut ½x1¼x12½	.05
1 ½ bird drivel rod	.08
1 crank shaft turned at a local garage per details shown in Plate F	2.00
3 carriage bolts ¼"x8"	.10
10 carriage bolts ¼"x3"	.20
4 stove bolts ¼"x3"	.08
18 quarter inch washers	.05
12 three-eighths inch washers	.05
6 three-eighths inch screw eyes	.05
6 lag screws ⅝"x6"	.12
1 piece copper oil feed pipe ¼"x4"	...
3 feet rubber tubing ¼"	.30
Total cost of Jig Saw	$8.74

(To be continued.)

Drawing and the Project Method

Helen M. Stockton, State Normal School, Trenton, N. J.

THE importance of drawing as a factor in the project method of education can not be over estimated.

Drawing in this connection is used as English is used, merely as a tool or as a means of expression of ideas.

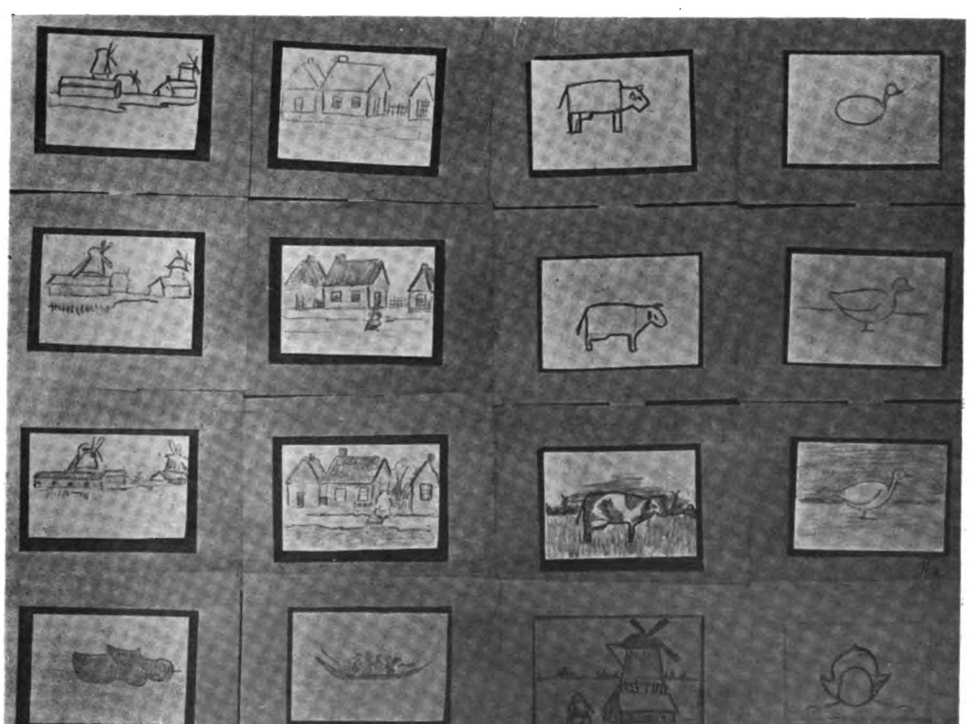
The accompanying illustrations which were worked out in the second grade in connection with a project on Dutch life, show that even in the case of very small children this power of expression can be developed without difficulty. The top row in each case shows the starting point, the second row the second step and the third row the completed picture. These pictures were drawn with colored crayons, and fairly intelligent and accurate observations on the part of the child were required in order to produce them.

It was necessary for the children to have some ideas concerning Dutch homes, costumes and customs before starting to draw. As the pictures developed, hazy ideas were replaced by definite, accurate, mental images and the details were then added to the pictures.

Drawing in this way proved to be of great value not only as an aid in forming ideas but also as a means of expressing and clarifying them.

The children's illustrations were finally used as a basis for their English work and formed a valuable part of the project which correlated many of the subjects of the curriculum.

DRAWINGS OF DUTCH CHILDREN.



CHILDREN'S DRAWING OF DUTCH HOMES AND ANIMALS.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

LET US GIVE THANKS.

Again the season of thanksgiving has come. We are reminded that our blessings should be carefully invoiced and that we should be thankful according to the balance in our favor. If we were fortunate enough to go to foreign countries last summer, as more American teachers did than in previous summers, we should have no difficulty in finding a balance of blessings in our favor.

The American teacher who goes abroad is twice blessed. Blessed in the privilege of going abroad, and blessed in the privilege of returning to America. If we were blessed with the privilege of a holiday summer at home we have much to be thankful for. If we spent the summer at hard work we received that satisfaction which hard work always brings.

In the way of somewhat better salaries and somewhat relieved school conditions, the American teacher is greatly blessed this year. Few occupations offer advantages this year over last year, but teaching, in America, is one of those few. The profession of teaching is on the mend. The teachers are also on the mend, and that is a double blessing; for teaching, like mercy, is twice blessed—"it blesseth him that gives and him that takes."

DEGENERATE ART.

We have before us a protest from a committee of citizens and supporters of the Metropolitan Museum, directed against the exhibition of "degenerate modernistic works" in the galleries of that splendid institution. We have not seen this exhibition but have been subjected to similar exhibitions elsewhere, and have observed these secession and modernistic movements in various expressions of degeneracy, a few of which seemed to us almost worth while.

The reasons for protest given by the committee are as follows: First, "The modernistic cults in the Arts are attempting to overthrow the present aesthetic system by the deification of ugliness." Second, "The modernistic cults in the Arts were organized by greedy dealers who seek to create a market for radical pictures by bidding them up at sales." Third, "Modernistic Art is a well-known form of insanity and the result of a disordered mind."

We are not greatly concerned about the first change because we consider the second and third as evident to normal individuals. To be sure, all cults and isms are directed to overthrow the established order of things. They rarely succeed in doing more than testing the established order and so expose its weaknesses and emphasize its strength.

In the case of ugliness versus beauty we are confident that beauty will win and ugliness will condemn itself. We are inclined to believe that enough ugliness will be presented to Americans without a deliberate exposition of it in the galleries, but if bad things need to be shown by way of comparison with the good, no institution can do this with greater safety than the Metropolitan Museum.

The charge most apt to prove disastrous to institutions is one of favoritism or class distinction. Democracy is quite as essential in the art of a people as in government. It is unfortunate to waste even a small part of the valuable facilities of the Metropolitan Museum with worthless collections, but who can say with certainty that an occasional exhibition of extreme types is worthless? We have great confidence in the judgment of those who have developed and maintained the Metropolitan Museum.

TEACHERS' ASSOCIATIONS AND THEIR PROGRAMS.

The teachers' association season has arrived. Without reflecting in any way upon the value and the importance of teachers' associations, it is nevertheless true that much valuable time and great expense are wasted in teachers' associations.

So many of the addresses heard at teachers' meetings are such vague generalizations as to be of but little, if any, assistance. Some of them are educational claptrap, that by courtesy has been called "inspirational."

Another pitiful and deplorable practice is the loading down of the special or sectional programs of state and district meetings, with speakers who are in no wise specialists in the fields represented by the audiences which they address. Many a round table or section meeting on industrial or vocational education has been ruined and the time wasted by speakers with only the most superficial knowledge of these special lines or by posers who profess an interest they do not feel or show.

The chief difficulty has lain in the fact that the funds have been used for the general programs and the sections have been compelled to use the same material.

The only solution for the problem as regards industrial and vocational education would seem to be, to get by some means, an effective representation on the executive boards or committees. The only way to do this is to have a large representation of people engaged in these special fields and the general meetings, and especially at the business meetings of the various associations.

More and more the specialists in art, industrial education, home economics, and vocational education must become identified with the general movements and the general work of the schools. It is doubtful if

this generation will see the general school administrators and teachers fundamentally interested and adequately informed concerning the various types of special work.

The teachers of the special subjects must, therefore, maintain strong organizations of their own special groups and perfect their work and at the same time participate fully, as suggested above, in the organizations and activities of the general school people.

THE PRODIGAL'S RETURN.

Reports from institutions and departments of industrial and vocational education indicate a much increased attendance, in spite of the depressed financial condition of the country. The indications are that teachers who were diverted for a time from the educational field on account of considerations of remuneration and experience are flocking back to the profession and are brushing up ready to render better service.

Welcome back, brethren! We can't offer you the fatted calf, but we'll help you into jobs. Your salaries will probably be larger than those you left when you made the change. For your information, it should be said that it still costs for a teacher to live, but thus far we have heard from no teachers who have decided to quit living on that account.

There is yet room for good teachers. We hope that no failures in the business and industrial world will simply land in the teaching profession in self-defense. It probably never has been true that some people teach because they can't do anything else. More than ever must it be true now that teachers enter the profession and remain in it because they have a liking and an aptitude for this kind of service.

There are opportunities now in the teaching business for ambitious men and women who desire to render an honorable and effective service and to reap satisfying rewards. There was never a time when we could more conscientiously commend teaching to high grade, forward looking young men and women than the present.

May the prodigals continue to return and may the appeal of the teaching profession become stronger and stronger to the highest types of young men and women in this country. It is a worthy profession and it deserves worthy people.

THE SCHOOLS AND THE UNEMPLOYED BOYS AND GIRLS.

Now is the time of all times to make it possible for the working boys and girls to go to school. Times are hard, money is difficult to get, and employment is scarce and uncertain. What can boys do who lose their jobs and fail to get others? Some of them are wise enough and farsighted enough to want to get into school to prepare for the days when prosperity returns, when business and industry open up, and when men go to work again.

The difficulty is that in an overwhelming number of instances there are not schools or classes available for these ambitious ones. In the average community, the high school does not and cannot meet the situation in its daily program and night schools have been discontinued for lack of funds.

Compulsory attendance and part-time schools would seem to offer the best, if not the only, solution to this problem. Dependence cannot be placed upon spasmodic efforts by local organizations and interested individuals. The pressing necessity demands a *system* of handling this problem and a state-wide and even nation-wide organization for this purpose.

It is a lamentable fact that as the stress grows more intense, the disposition on the part of some states and many local school systems is to suspend the operation of the only agency that offered any sort of relief—the part-time school.

The most short-sighted policy that could be adopted by any community is the one that abandons the part-time school or postpones its establishment simply because the matter has been left to the option of the local community.

The public school should become more and more a *conserving* force that operates to stabilize and clarify situations when unsettled conditions arise and disintegration sets in. Perhaps it is a tribute to the public schools to say that they are conservative. Sometimes they are too unresponsive. They certainly should not be too responsive to conditions and influences that hurt and mar; but they should respond at once to the demands of society in helping to meet a complicated and trying situation like the unemployment situation that now confronts them. They cannot furnish employment; but they can provide instruction and training that will fit boys and girls out of employment for better positions and greater service when business and industry revive.

Study, and study hard. But never let the thought enter your mind that study *alone* will lead you to the heights of usefulness and success—*Grover Cleveland.*

The state of a laborer's mind, more, even, than the state of his purse, determines his acts. Our technical schools are training the future brain workers and managers of industry. We may, therefore, well ask ourselves, at this time, if there is anything we can do beyond what we are now doing to train our students to understand more fundamentally and to meet more successfully the gravest of all their future responsibilities, the organization and management of men—a responsibility which they and we owe, not to industry alone, but to the whole economic, social and political stability of the nation.—*Dr. Ernest Fox Nichols,* president Massachusetts Institute of Technology.

If I must be an extremist, I prefer to be one who believes that in every oyster shell there is a pearl rather than be one who is quite convinced that every oyster in every shell is bad.—*Dreier.*

Shame on the man of cultivated taste who permits refinement to develop into a fastidiousness that unfits him for doing rough work of a workaday world.—*Roosevelt.*

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

WINTER CARE OF OUR NATIVE BIRDS — A FALL PROJECT

Leon H. Baxter

In order to successfully attract and hold our feathered friends during the winter, we must begin early to scatter hayseed, millet and table scraps near the house.

It is a good plan to begin quite a distance from the buildings and after the birds are seen to be feeding, gradually drop the food nearer the house, until finally they will fearlessly feed from the window sill.

In the early fall, suet and meat scraps will keep better tied to the shady side of the tree. Later on, during cooler weather, they should be attached to the sunny side.

The birds may seem to ignore the food offerings at first, but as other food material gets less plentiful, they will soon be seen feeding on the crumbs we have prepared for them.

Many birds which would seek a more plentiful food supply further south will not be attracted and held, and after once securing their attention and accustoming them to their human friends we must see their food supply does not fail. The following birds have been attracted and held during the winter by food shelves: Chickadees, nuthatches, wood-peckers, juncos and even the wary jay.

Feeders may be made from almost any material and may be very plain or artistically constructed and bark covered. Feeders are as interesting to make in the early fall as bird houses are in the spring. The photograph shows a group of prize winning feeders.

PRIZE WINNERS.

Corn, suet, meat scraps, crumbs from the table, pieces of doughnut, nuts, sunflower seed, frozen milk and many other food materials may be utilized if one wishes to experiment.

The birds will furnish excellent instruction and amusement to the household during the winter and a vast amount of good may be accomplished in this manner, adding greatly to the comfort and happiness of our wild bird friends.

Plate 1

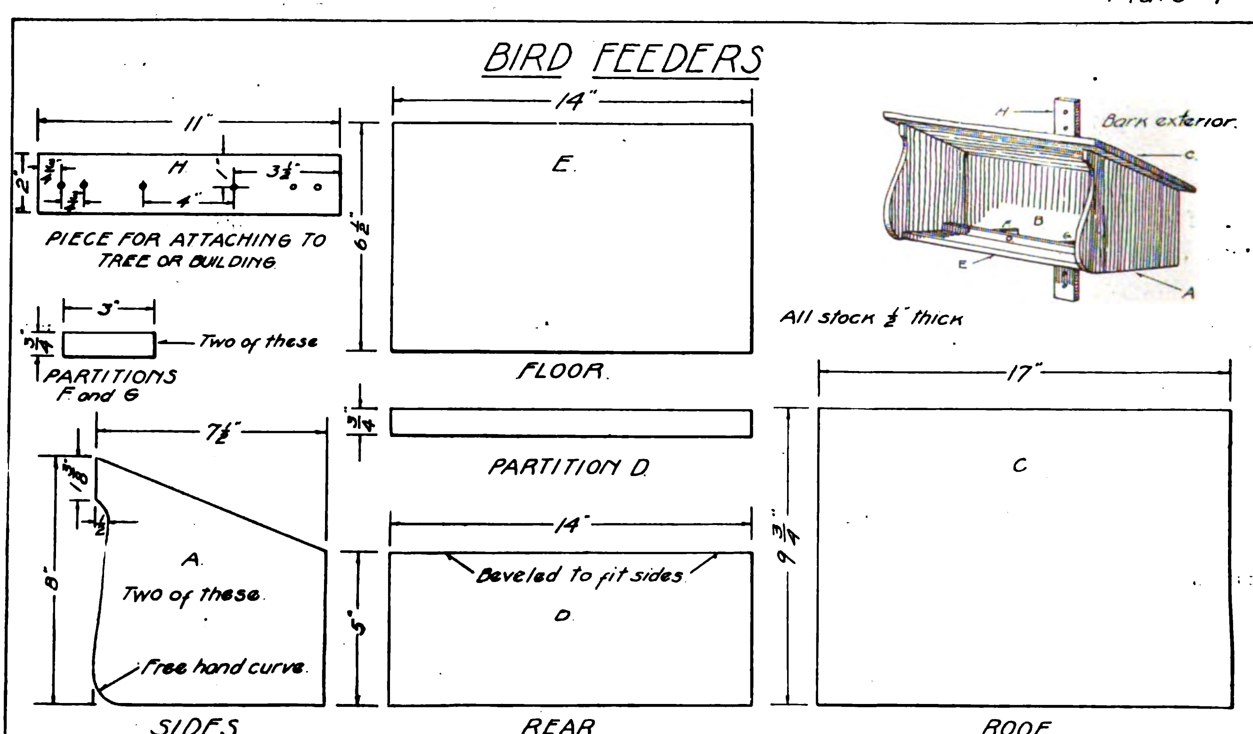


Plate 2

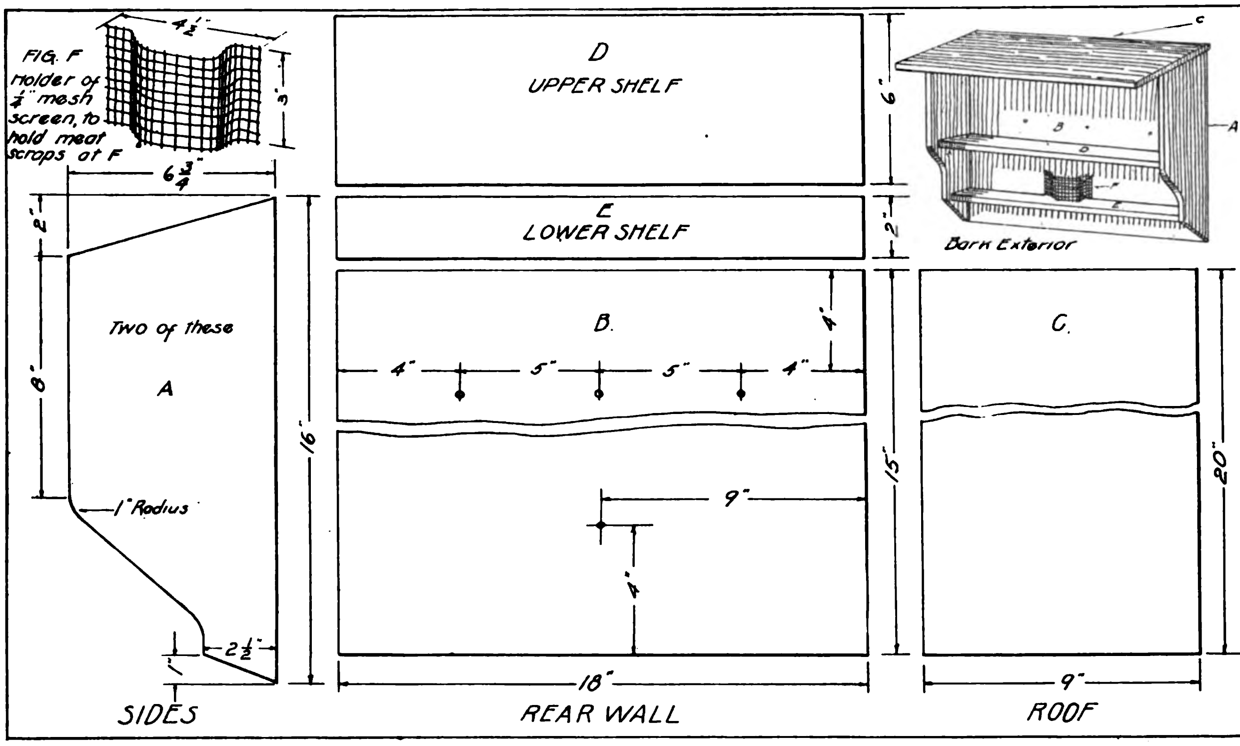
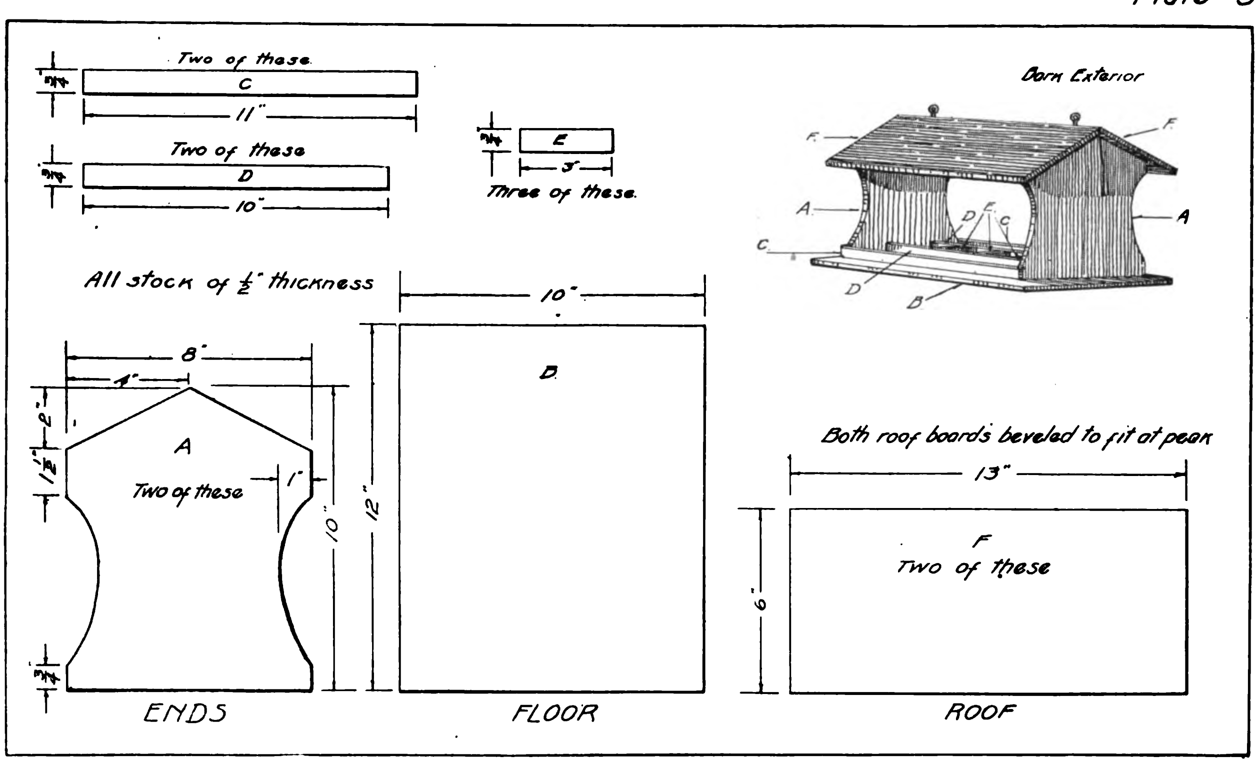


Plate 3

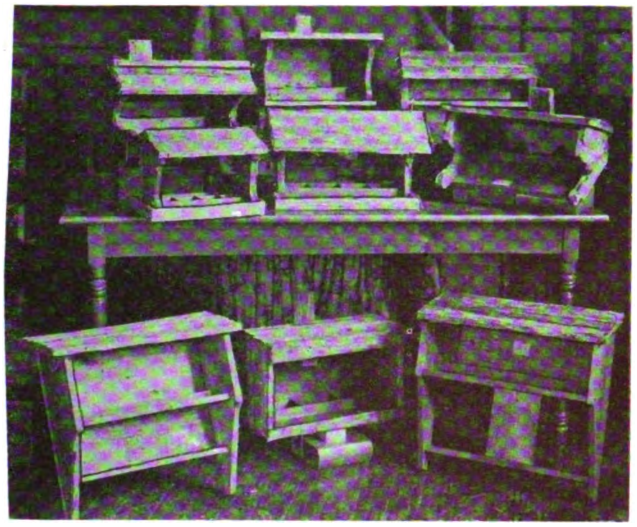


Consider the feeder you wish to make and after consulting the drawing and being sure every detail is clear to you, procure a half-inch board, of either spruce, cypress or soft pine, of a width that will allow you to get out the various pieces with as little waste as possible.

Illustration I shows a simple artistic feeder suitable to be attached to a tree or building. A board 10" wide will be found suitable for cutting out the pieces.

The two sides, A, should first be cut out in one piece 8"x$15\frac{1}{8}$" the extra eighth allowing for the saw cut when cut in two.

Plane one edge of the piece straight and smooth and call this working edge, or edge from which all measurements are to be taken. Square one and square with both the working edge and the surface. Measure from this square end the length called for, which is $15\frac{1}{8}$", and square a line across the board, placing the try-square handle tight against the working edge.



BIRD FEEDERS MADE IN THE AUTHOR'S CLASSES.

With the cross-cut saw carefully saw just outside your line on the side away from the piece to be cut off. Now plane back to the line and no further. The width is next obtained, which is 8". Draw a line parallel to the working edge and 8" from it.

Saw just outside this line and then plane to it, taking care to get the edge square. Each piece in all of the plates is treated in this same manner.

The piece should now be exactly 8" wide by 15⅛" long. Cut the piece carefully in two equal parts, each of which will be 8" wide by 7½" long. From one corner of the longer side measure 5" and draw a line to the opposite further corner, thus getting the pitch of the roof. Saw and plane carefully to this line. Measure down on the other long side 1⅜" as shown, and starting here draw a free-hand curve similar to the one on the drawing, seeing that the curve only cuts in ½". Cut this curve with either a turning saw or chisel and file smooth. Place the completed side on the unfinished piece and tracing around, finish in a similar manner.

The angular pieces from the sides can be used in cutting the partitions F and G.

The rear, B, the piece, H, and the partition, D, can next be cut from one piece of the board previously used, 14" long. Finish B, 5" by 14" piece H, 2" by 11" and partition, D, ¾" by 14". The floor E, is to be cut 6½" by 14". Roof, C, is finished 9¾" by 17".

Holes are bored in the piece H where shown, for attaching to back of feeder and to house or tree. In assembling partitions D, F, and G should be nailed together with inch brads first. The two sides of A are securely nailed to the floor, E, and rear, B, then nailed in place. Nail in partitions D, F, and G before attaching the roof, as it will be found easier to do that now. Attach roof in such a manner that the rear edge is flush with the rear wall and has equal projections over the sides.

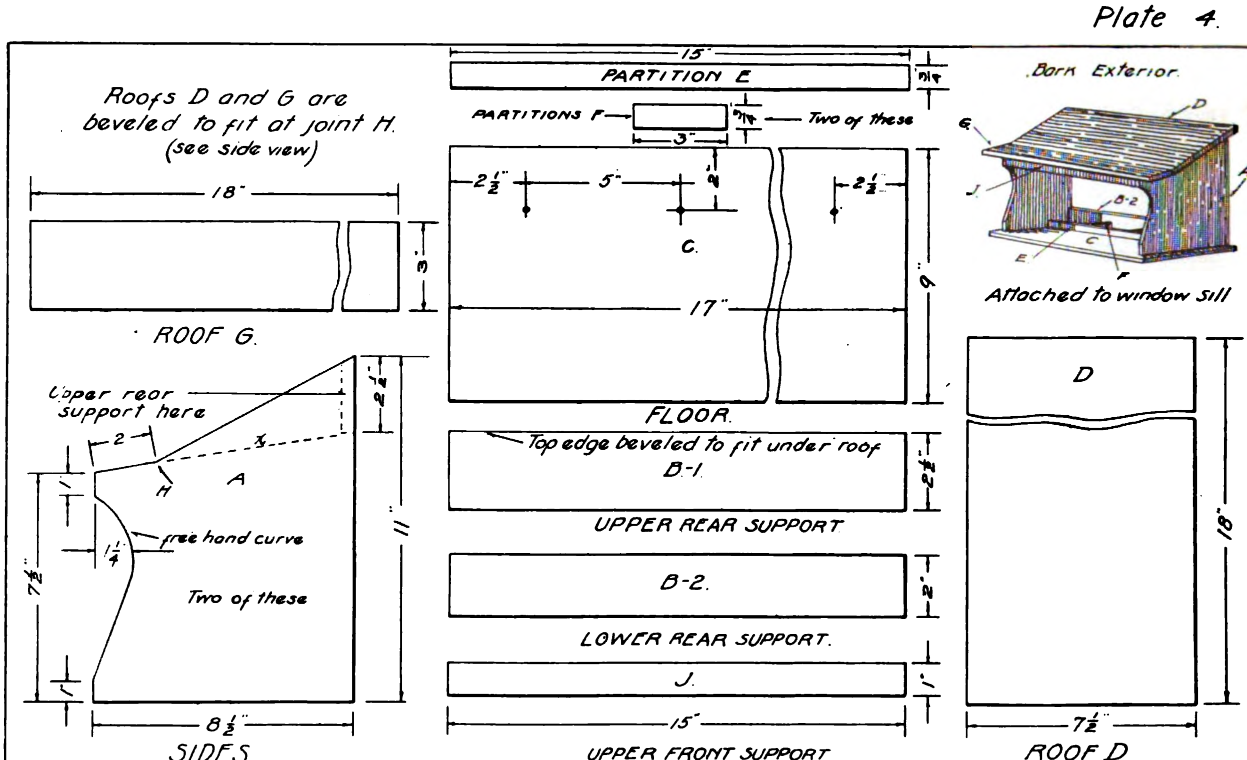
The last piece to be attached is piece H, which is held in place by 1" flat head screws. The interior should be stained brown, Johnson's No. 125 Mission Stain being very good. The exterior should be covered with cedar bark held in place by 4 oz. tacks, as shown in the group photo.

The remaining three illustrations can be read and the feeders made without any difficulty if a little careful thought is used and each piece is checked up before cutting.

Illustration II is a very successful feeder with two shelves, the lower one having a wire container for holding suet and meat scraps. This can be bent into shape in a vise or pounded over a block of wood. The upper shelf could be divided by partitions similar to those in Illustration I if desired.

The two sides, A, are the only two places that may give any trouble. They finish 6¾" wide and 16" long. Measure down on one side 2" and draw to opposite upper corner. Measure 8" beyond the 2" measurement. Next from lower long edge measure out 2½" and up 1" as indicated, and draw the sloping line. From this point, with a 1" radius, strike an arc and in a similar way from the 8" measurement do the same and draw the long sloping line.

Plate 4.



These may now easily be cut out, taking care that the two sides are exact duplicates.

Illustration III is a feeder designed to be attached to a wire or rope strung between a tree and house. One interesting feature of this type is that after the birds have started coming to it, it may be pulled a little nearer to the house each day, until the birds are feeding close to the window, where they can be easily observed.

The two ends are first cut 8″ wide by 10″ long. Locate the center of one end with a dot. Measure down each side 2″. Draw to center point for roof pitch. Measure from end of eaves 1½″ on each side. Measure up from bottom ¾″ as shown. From these points to points previously drawn, sketch a free hand curve, seeing that it does not cut in but one inch. The drawing shows clearly all of these dimensions.

Illustration IV gives the drawings and sketch of a feeder with the rear part open. This is so that it may be attached to a window sill and the birds observed from the interior of a room. After the birds are accustomed to it, the window may be raised slightly and crumbs held in the hand to entice some venturesome songster. The writer has found chickadees very tame, and in a short time they will fearlessly sit on the finger tips and feed on the crumbs.

The sides finish 8½″ wide by 11″ long. Measure up form one end 7½″ on the long way of board. Measure down from upper right hand corner 2½″. Draw from first measurement to this point a light line. Measure on this line 2″ as shown, and from this point, II, draw to upper right hand corner. This completes the double pitch of the roof.

From lower right hand corner measure up 1″ and sketch a free-hand curve to within 1″ of roof slope. See that the curve runs in only 1½″. Cut out with turning saw and chisel and smooth up with a file.

The remaining pieces are easily cut to size.

MADE BY STUDENTS OF THE BAKERSFIELD HIGH SCHOOL.

DINING TABLE AND CHAIRS

K. W. Rich, Bakersfield, Calif.

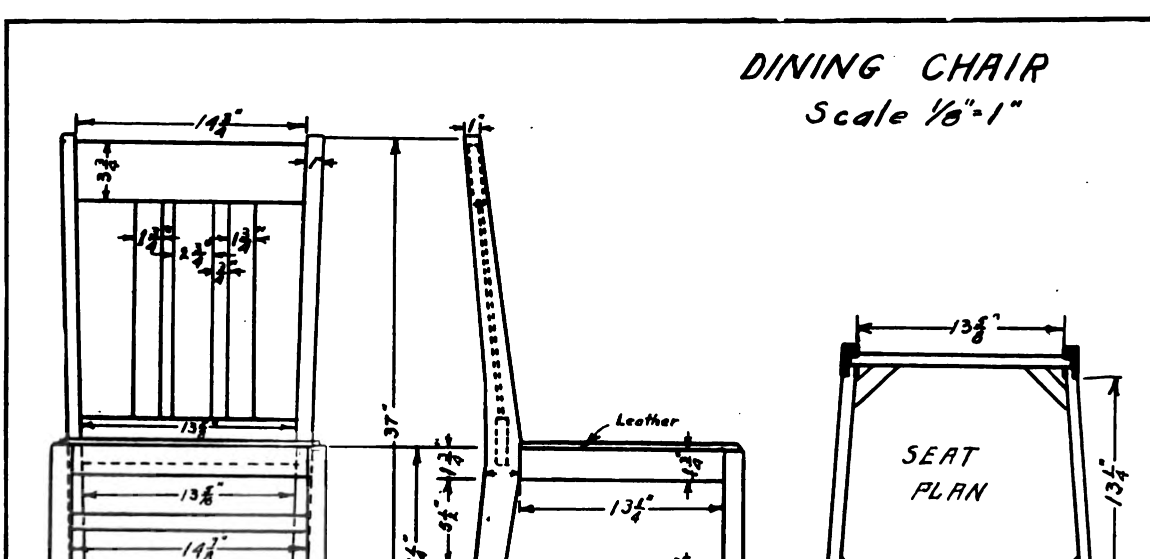
The dining table and chairs shown in the accompanying drawings and photograph have been quite popular with advanced students. One girl working alone, and doing most of her cutting work on the band saw, completed a table and six chairs last year.

For the chairs, a leather slip seat is preferable, though one or two have used shaped wooden seats. In the latter case the seat was slightly recessed on the lathe, then shaped with scrub plane, rounded scraper, and sandpaper. If spline or dowels are used to join pieces in seat, care should be taken to offset enough to prevent cutting through when shaping the saddle seat.

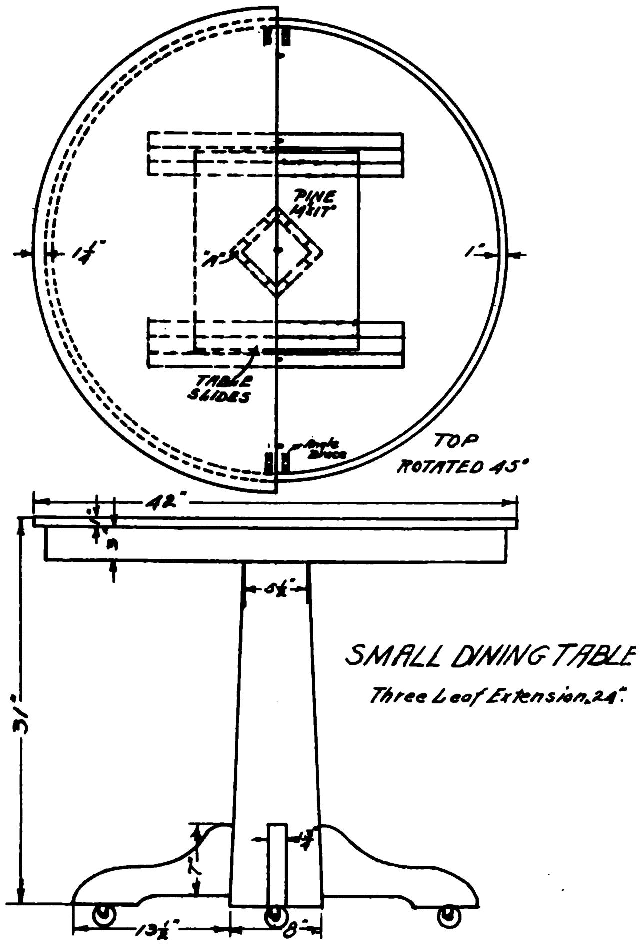
For leather slip seat the inner corner of the two front legs should be recessed enough so that the leather only will project above the top of the legs.

Braces, as shown in the seat plan, are always advisable.

A full-sized drawing should be carefully made of all three views shown. This drawing must be accurate, as the various angles are taken directly from it by means of the bevel square. All pieces must be cut to exact dimensions.



DETAILS OF CHAIR.



DETAILS OF TABLE.

We always find a tendency upon the part of our students to cut tenons too small, in a universal belief that glue will remedy any looseness if only plenty of it is administered. Where tenons are as short as is necessarily the case in most chair work, this would be disastrous.

A jig, made of a piece of scrap wood cut at the proper angle, with a notch at the end to prevent feeding in too far, and then clamped to the band or jig saw table, is the method used for cutting tenons on an angle when many of them of the same pattern are to be made.

Dining Table.

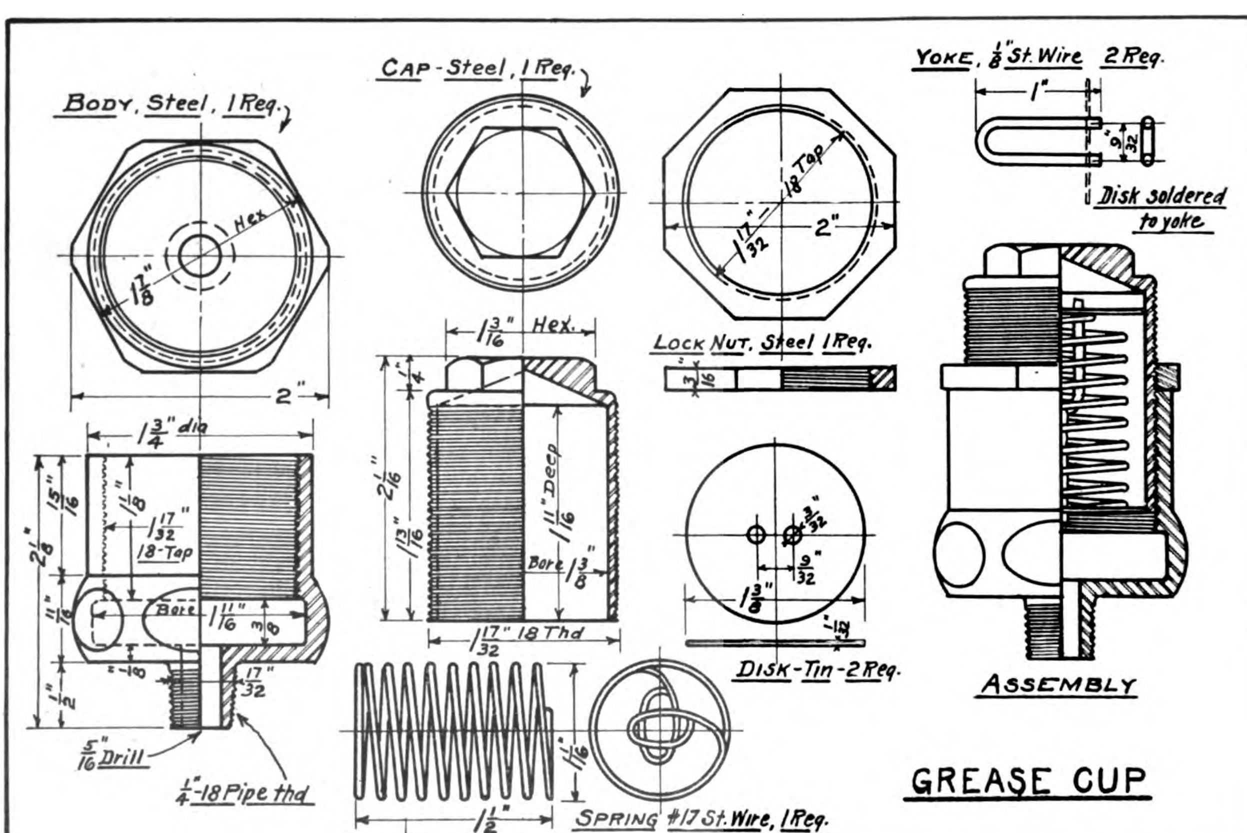
The table itself as here shown is a common commercial type of small extension table with solid pedestal. We have made larger tables of the same sort, but the divided pedestal type should be used for a top much larger in diameter.

An easy way to make a strong pedestal is to rip from the table leg stock a square section from one edge, and then utilize the remainder as one corner of the pedestal. See "A" in the top view of accompanying drawing. Between each of the four corners so prepared is dowelled a wedge shaped piece to bring the pedestal to the required dimensions.

The feet are cut from solid stock and fastened with lag screws, two to each foot, passing through the base of the pedestal.

The one by three inch rim is made by cutting segments of white pine about eight inches in length and 7/8" wide from 3/4" stock. The template by means of which the stock is marked must be carefully laid out with regard to proper curvature and to angle at either end. When sufficient segments have been cut (forty or fifty will be needed) proceed to assemble with glue and handscrews, using an occasional nail to prevent slipping if necessary.

After glue is dry take two two by fours as long as the inside diameter of the rim and half lap them in the center,



DETAILS OF GREASE CUP.

the sticks forming diameters at right angles to each other. Nail the rim to the sticks using finish nails and setting them into the rim ¼". Screw to an outside face plate and dress to a true circle on the lathe. Fill all holes with plugs or saw dust and glue. Glue size the outside of the rim and set aside to dry.

Rip a piece of ⅛" or 3/16" sawn veneer about 3¼" wide and long enough to move then reach around the circumference of the rail. Glue this to the rail, keeping cove and veneer warm and using plenty of hand screws. It is a good plan to heat a thin strip of wood to bend between screws and veneer to act as a caul. Leave clamps on for several days, then dress up both sides with circular plane, etc. Weight the rim to a flat surface until ready to attach to table top. Screws set deeply into under side of rim are satisfactory fastenings. Do not cut the rim into sections until finally fastened in place.

Attach pedestal top to pine piece by screws through top of pine. The slides after being screwed to table top are also screwed to the pine.

Table slides are inexpensive and are not worth the trouble to make. If one is desirous of making slides and all, by all means secure an old slide and study its construction before attempting to fashion something upon which the satisfactory use of the table depends.

Angle braces on either side of either joint of the rail, as shown in the drawing, are advisable.

GREASE CUP.

Harold Diemer, Director of Vocational Education, Calumet, Mich.

This little problem is of value for the variety of operations it involves. The plate is self-explanatory.

A WINDOW VENTILATOR.

J. I. Sowers, Vincennes, Ind.

This window screen is made up of pine. The sizes vary, each pupil taking the measurements of his own window in which the screen is to be used. It will be noted that the screen has a ¾ inch adjustment, by means of the small slide at one end, this permits the screen to be put in position in the window and the slide extended to take up the necessary shortness of the screen, which must be made shorter than the space it is to occupy in length, in order to let it pass the window stops as it is being put in position.

The screen has a piece of coarse cloth tacked on the outside and held in position by narrow strips of moulding, as suggested in the isometric drawing. In use the screen prevents the danger of direct drafts of air and also keeps dirt, soot and cinders from the rooms. As a problem we find it very interesting, and useful. We are using it in our 8B grade work.

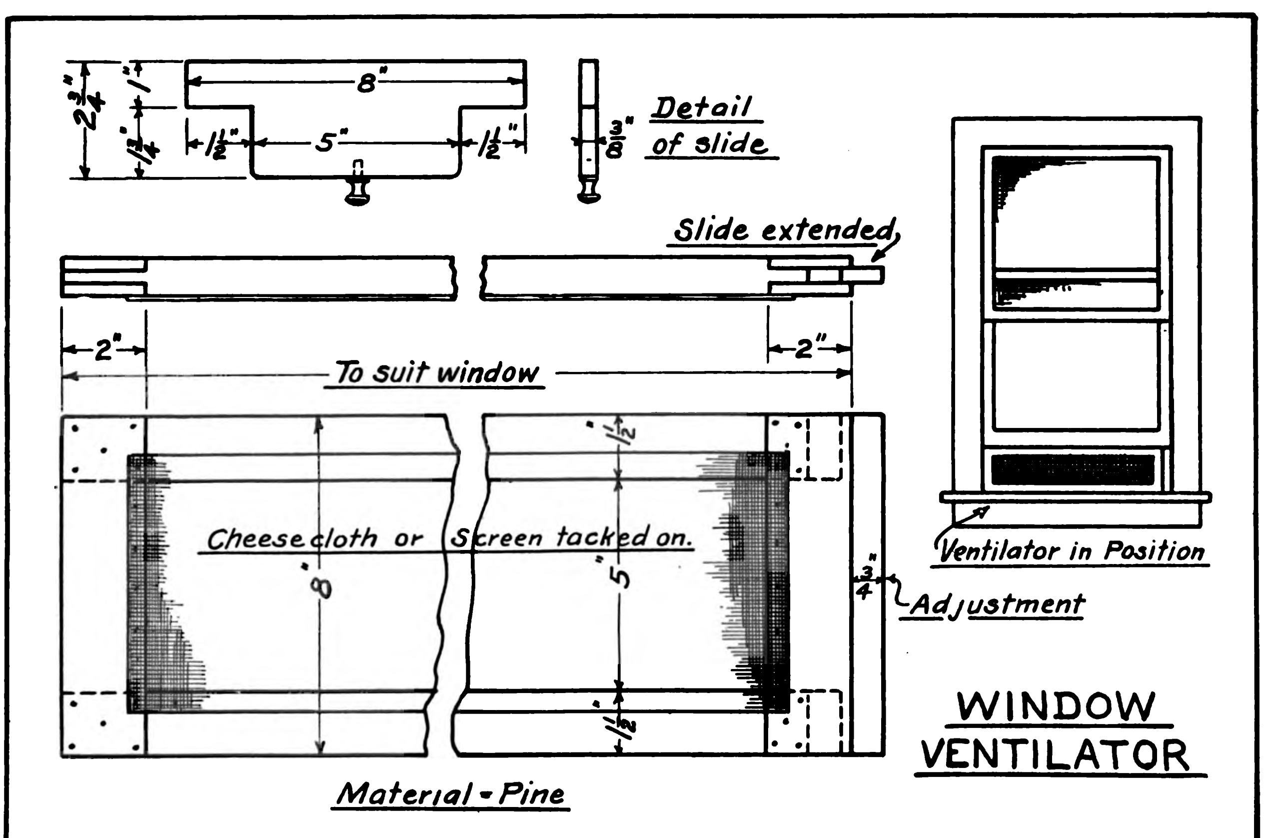
THE VALUE OF PRINTING IN PUBLIC SCHOOLS.

There is a physiological necessity on the part of the child for motor activity and the foremost educators of today insist that a considerable part of the school program should consist of activities. Printing provides for the schoolroom an activity of universal interest and high educational value.

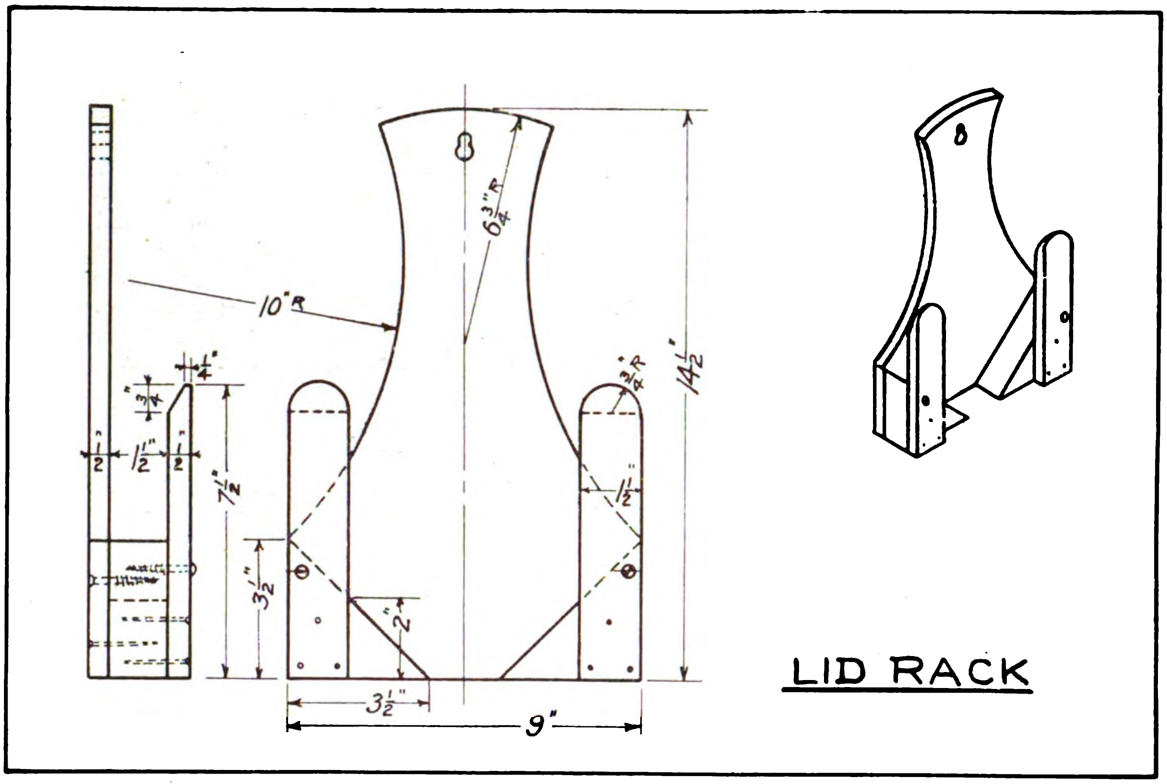
Printing vitalizes other school subjects by affording opportunity for the practical application of the information acquired in them in ways that appeal to children as worth while. This is especially true for reading, language, English and art.

Industrial intelligence should be an important objective of school work for children of the leading industrial nation in this preeminently industrial age. Through the printshop pupils secure a first-hand experience in the fifth industry of the country and learn its fundamental principles and processes.

In the matter of social significance printing is practically ideal. Almost every problem is a community project that a number of pupils combine their efforts to produce. Practically every task in the printshop is undertaken with the consciousness of real service to a great number of



DETAILS OF SCREENED WINDOW VENTILATOR.



DETAILS OF LID RACK.

people in the school or in the community at large. The home-printed school paper has almost unlimited possibilities in social values.

There is just as great need of education for intelligent consumption as there is for efficient production. After food, clothing and shelter, printed matter ranks as the next most important item utilized in the civilized world today. Adequate appreciation of the product of an art can only be acquired through creative effort in that art.

The knowledge and experience obtained from a school course in printing is of considerable value, not only to the many who enter some one of the many occupations of the printing trades, and to those who become editors, authors and publishers but also to the much greater number who enter occupations which have much to do with printing in the way of advertising, issuing catalogs, and other publicity work.—Peabody Reflector, Peabody College for Teachers, Nashville, Tenn.

A LID RACK.

W. W. White, Waterloo, Ia.

This problem is entirely new in the Waterloo schools and has proven of great interest. Formerly the tin and granite covers of the kitchen rested in a wire frame from the ten cent store, or worse, they were stored behind the pots and pans in the pantry cabinet. This staunch little rack made of any soft wood and painted or shellaced and varnished, will put the wire holder to shame. The problem is excellent for the 6A or 7B grade.

MANUAL TRAINING EXHIBIT, PUBLIC SCHOOLS, RUMFORD, ME.

VOCATIONAL TEACHERS' SELF-ANALYSIS CHART

"A set of questions for testing your efficiency."

1. Have you a well-arranged Course of Study on file for ready reference? Do you refer to it, modify it, add to it from time to time? What is your contribution to the cause of vocational education in this respect?

2. Are you a factor and a force in your trade union? Do you champion the vocational school movement whenever possible?

3. Do you attend vocational meetings and conventions whenever possible? Are you a "live" member of school associations and clubs.

4. Is your room or shop a model of orderly arrangement, system and neatness? Are you making the best showing possible under your present conditions?

5. Are you a vital factor in the vocational movement outside of your schoolroom? Do you contribute to vocational and educational journals the good results of your teaching experiences?

6. Are you keeping abreast with the times in your own trade line? Do you visit commercial shops regularly? Are you known to the important men in your trade?

7. "I can imagine no better form of education for a boy than a friendship of his own choosing with a schoolmaster whom he respects and likes."—C. A. Alington, Headmaster, Shrewsbury School, England.

To what extent are you a "Big Brother" to your boys? Do you establish a personal touch with each of your pupils?

8. Shop Teachers:—Aside from teaching trade processes and operations, are you training your boys in the right mental attitudes toward their work?

9. Have you constantly in mind your mission in "general character training" as well as the teaching of your specific subjects?

10. Do you find joy in your service as a teacher? Are you "large of vision," ever learning, willing to try something new and better, and anxious for self-improvement?

11. Have you a broad conception of education as a whole,—or do you mistake your particular "segment of the educational circle for the entire circle?"

12. Are you an example of the best things in efficiency and scientific management?

Do you administer your shop wisely?

Are the city's tools and machines properly taken care of?

Have you an efficient toolroom and stock-keeping system?

Are many things lost or stolen from your room because of lack of proper checking each day?

Do you keep your plant in good repair?

13. Are your personal habits of speech, dress, etc., such as to inspire boys to higher things?

14. Do you co-operate with your principal and director in carrying out suggestions with promptness and dispatch?

THE RED CROSS MAKES ITS ANNUAL APPEAL.

15. Do you systematically plan your shopwork lessons? Your bookwork lessons? Does every boy get a "square deal"? Have you a systematic scheme of keeping track of a student's work, progress and accomplishment? Does every pupil get an "all-round training?" Do you allow favorites to monopolize your time?

16. Are you doing your share in assisting in outside-of-school activities; such as, clubs, athletics, school paper, orchestra, etc.?

17. Do you assist your backward pupils in making up time and work after school? Do you ever suggest to boys your willingness to render special after-school assistance?

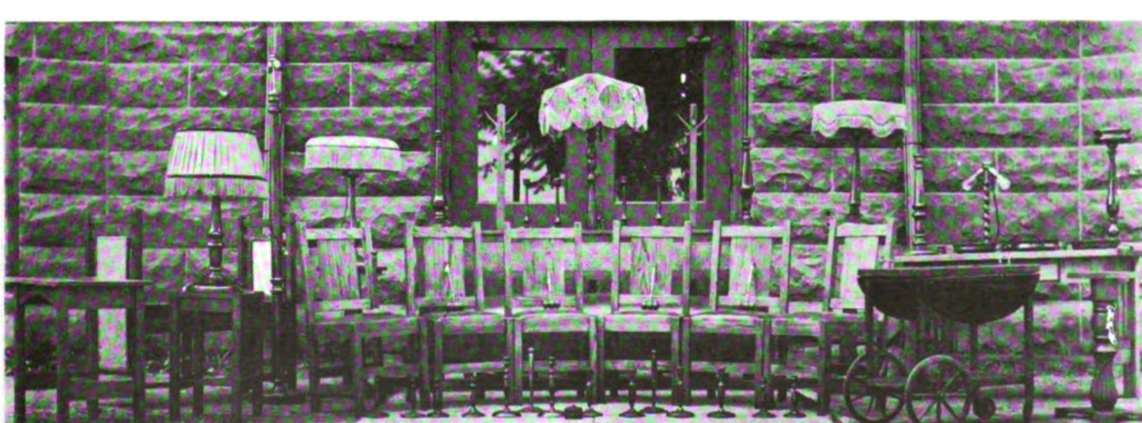
18. How do you spend your vacant class periods? Have you a regular plan of visiting shops and discovering material for related bookwork?

19. Do you get along well with your lads? To what extent do you find it necessary to rely on office assistance in cases of discipline?

20. Are you a factor in helping to build up the morale in the school in which you are teaching?

21. Are you working toward "Economy of Time" in the teaching of your subject?

—Wm. B. Kamprath, Principal, Elm Vocational School, Buffalo, N. Y.



A FEW ARTICLES PRODUCED IN THE FORT DODGE, IA., SCHOOLS. MR. E. T. SNIVELY, DIRECTOR, MR. GEORGE TRUE, ASSISTANT.

A FEW ARTICLES MADE BY FRESHMEN AND SOPHOMORES IN THE MT. VERNON, WASH., HIGH SCHOOL. W. W. NOLIN, DIRECTOR.

NEW BOOKS

Industrial Mathematics Practically Applied.

By Paul V. Farnsworth. Cloth, octavo, 272 pages. D. Van Nostrand Co., New York.

This book covers the entire range of practical mathemathics as applied to the metal working occupations. It is, as the author indicates in his preface, the result of twelve years of experience in teaching students in trade courses. The book reviews in less than fifty pages, the entire range of arithmetic and then takes up the elements of algebra and trigonometry. From this point on, it plunges into the applied mathematics of the shop without further consideration for a logical development of higher mathematical principles. The treatment follows the usual arrangement of topics in mechanics and proceeds from the simplest motions and force to the most complicated cam design. Each topic is introduced by means of definitions and descriptions and the mathematical elements are reduced to formulae with the standard engineering nomenclature. The problems are taken almost entirely from actual shop experience, with a very few examples of "boy interest."

The book appeals to us as the most thorough and teachable which has been offered for vocational classes in technical high schools and trade schools. It is especially satisfactory in its approach and in the insistence upon methods which are standard in the drafting room and the shop.

Drawing Room Practice.

By Frank A. Stanley. Cloth, 253 pages, illustrated. McGraw-Hill Book Co., New York, N. Y.

This work is a handbook for the young draftsman who desires to have at hand a statement of the theory and best practice of drawing as applied to the mechanical industries. The work is both text and reference book and statements, definitions and illustrations, while complete and detailed, are intended for the more mature mind rather than the novice. The book opens with a description of drawing instruments and leads the reader through all the principles of projection, development of surfaces, assembly and working drawings, etc., etc., to shop sketching. Of considerable value are chapters on tool drawings, limit and tolerance dimensions for quantity production, and working drawings of small and medium size mechanical parts.

The author has a fresh, clean cut style of presenting facts and discussing methods. He uses numerous photographs of castings and machine parts to make doubly clear the ideas he is driving home. The result is that the book is attractive and interesting and is a vast improvement over the usual dry-as-dust text on mechanical drawing.

The Welding Encyclopedia.

Compiled by L. B. Mackenzie and H. S. Card. Cloth, 326 pages. Price $5.00. The Welding Engineer Publishing Company, Chicago, Ill.

This book presents in alphabetical order the latest theoretical and practical information on autogenous welding by the several present day processes. The authors and editors of the book have had an unusual opportunity for gathering material because of their intimate connection with the field and their broad study of conditions. The book is fully illustrated and contains in addition to the general information on the subject much special information on specific problems and difficulties in welding. Special chapters are devoted to rules and regulations of the government and of associations, such as the Department of Commerce, Interstate Commerce Commission, the American Railway Association, the Underwriters Laboratories, the Board of Fire Underwriters, etc. Special tables on temperature, properties of metals, are included.

PUBLICATIONS.

Basket Willow Culture. By George N. Lamb, scientific assistant, Forest Service of the United States. Farmers' Bulletin 622, 1914, of the Department of Agriculture, Washington. The bulletin discusses the different varieties of basket willows and methods of willow growing which have been found most satisfactory as a result of experiments conducted at the Forest Service Willow Farm at Arlington, Va. It is of special interest to those engaged in, or contemplating basket-willow culture, and is applicable to all portions of the country where willows are grown.

Vocational Teachers' Review, summer session, 1921. State Normal and Training School, Oswego, N. Y. The summer session is conducted for teachers in industrial,

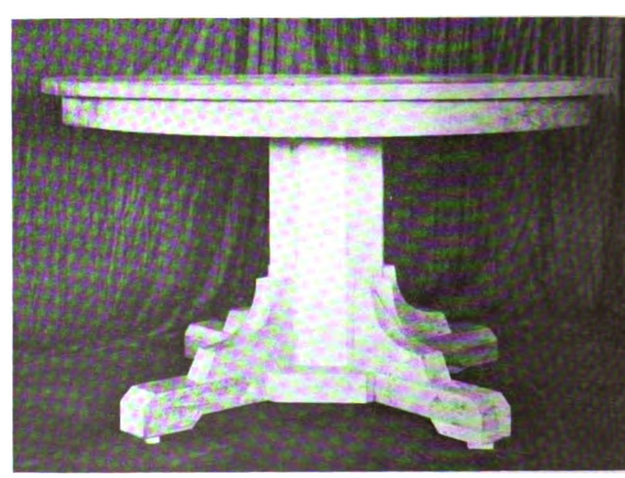
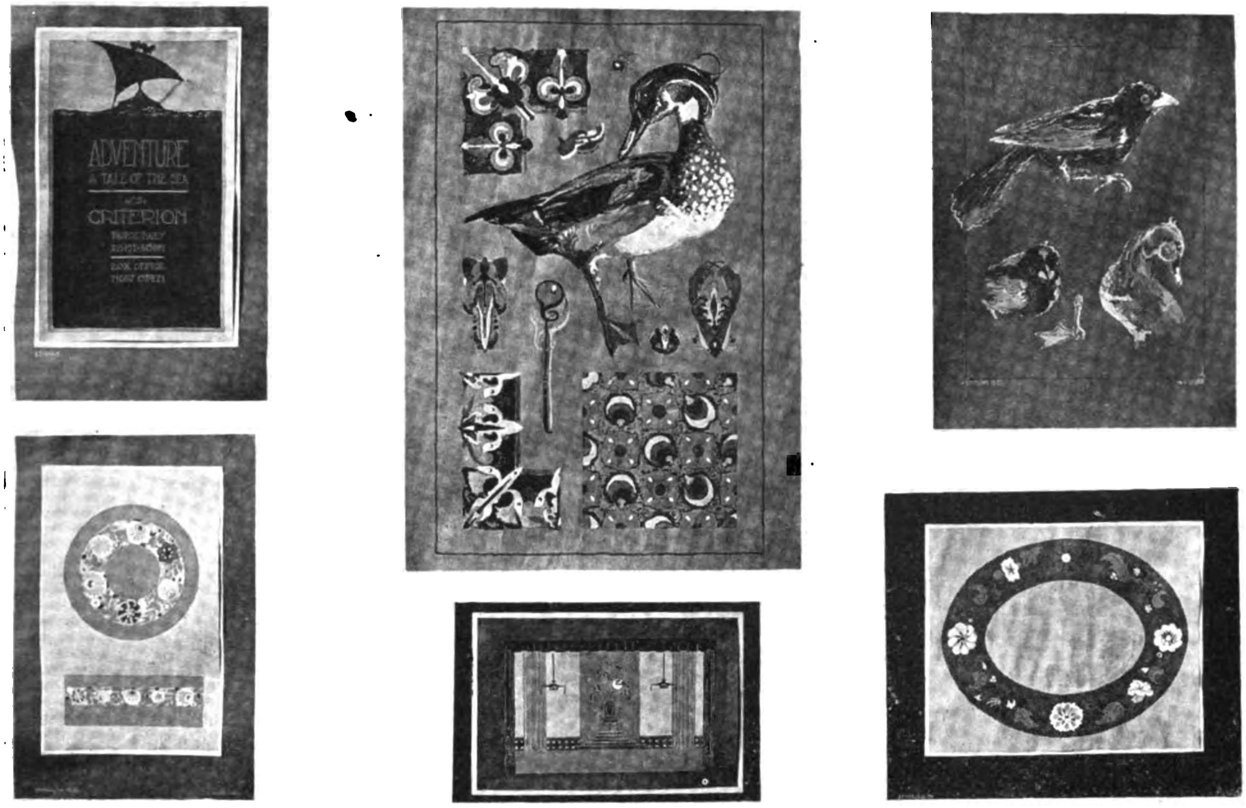


TABLE MADE BY A STUDENT OF THE MT. VERNON, WASH., HIGH SCHOOL.



NATURE AND DESIGN STUDIES BY DR. JAMES P. HANEY'S STUDENTS.
The above illustrations show the steps taken, in the New York University summer school, last July, to lead students to develop original motifs from the study of nature. Birds, flowers and other objects are searched for interesting motifs, and these are then applied to designs for many materials.

BATIK DESIGNS FROM DR. HANEY'S CLASSES.
Several scores of interesting batik designs were made in the art department of the New York University summer school, last July. The above illustrations show eight of these patterns for shawls. Several of the students developed their patterns on silk after having completed the designs in tempera.

part-time and foreman training classes and also teachers of trade work in unit trade schools, general industrial schools and evening vocational schools. The courses are planned so that teachers may strengthen their work in technique or on the professional side. Among the courses offered the past summer were electricity, elementary and advanced printing, woodworking, machine shop practice, sheet metal work, automobile mechanics, education and methods.

The Manhattan evening trade school, New York City, has introduced two new courses in interior decoration. The first is planned for those who desire to follow interior decoration as a profession. The second is a simple course including periods of art, furniture, upholstering, textiles, drapes, hangings, paintings, electrical appliances, color harmony in the home.

William H. Dooley has been chosen principal of the Textile High School of New York City. He had been acting principal since the opening of the school last year.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Mahogany Finish on Poplar.

233. Q:—How would you put a mahogany finish on poplar wood?—B. C.

A. The method necessary to produce mahogany finish on poplar will depend upon two things, i. e., whether a brown or red mahogany is desired. In case a brown or red mahogany is to be used, it will be necessary first to sponge the wood with a hot solution of two ounces of tannic acid crystals per gallon of hot water. This will raise the grain, which should be sanded smooth when dry. Prepare a hot solution of color by boiling two ounces of Bismark-brown analine, in one gallon of ordinary vinegar. Contrary to the nomenclature of the dye employed, this solution will produce a bright red shade which in contact with the sponging solution of tannic acid will produce a rich mahogany shade after eight to twelve hours in contact with the carbon dioxide of the atmosphere. If a still browner shade is necessary it is advantageous to mordant or set the color through the use of a further solution of two ounces of potassium dichromate crystals to a gallon of hot water.

Poplar is lacking the characteristic essentials of oak and birch, for instance, necessary to produce good shades of color; but through the use of the above stock solutions any shade of red or brown may be produced according to the method outlined. A straight red color, of course, can be produced through the acid solution of Bismark brown and vinegar alone; although the red shades are quite passé having been superseded by the richer and deeper toned shades of brown over red. After the stain coat has dried at least twelve hours give a very thin wash coat made from shellac reduced one-half with alcohol and tinted very slightly with Bismark brown. This tinting of the shellac seems to be necessary in order to overcome the grayish effect of the shellac under the varnish coat, which occurs when the tinting color is omitted. When the shellac coat is dry and hard it should be sanded down with a split 0000 or 00000 paper and cleaned up glass smooth. Dust off and varnish carefully. Dry three days or more and repeat the varnish coats until the desired depth of the finish is obtained. The last two coats should be rubbed with FF pumice stone, felt pad and water and cleaned up with a good oil polish. It is not necessary to fill poplar because of the entire lack of porosity.—Ralph G. Waring.

Texts on Reed Furniture Weaving.

235. Q:—I am contemplating having quite a little reed work done in my shop this coming year and am looking for information along this line. Can you refer me to any good texts on reed furniture weaving?—G. M. H.

A:—The following books will be found helpful in work of this kind:

"Worst's Problems in Woodwork in Combination with Other Materials," $2.50, Bruce Publishing Company; "Worst's Industrial Problems for the Middle Grades," $3.50, Bruce; "Perry's Seat Weaving," $1.25, Manual Arts Press, Peoria, Ill.

Varnish Trouble.

238. Q:—What is the trouble when varnish, applied to a table top for instance, will not dry and become hard but remains sticky.

How can I remove enamel from a high polish mahogany piano which was caused by rubbing against it in moving by another piece. There is just a very little bit about an inch on the front leg. Can it be removed without injuring the finish?—H. E. P.

A: It sometimes happens that unsuitable materials in the filler coat will prevent the proper hardening of the varnish; again some foreign material as a mineral oil occasionally finds its way into a varnish through accident and thereby causes it to remain sticky. The only recourse in a case of this kind is to entirely remove the finish, build it up properly and apply a very hard tough varnish, suited to this type of work, from a fresh paint can. Old varnish in a partly emptied can quite frequently assumes a condition which prevents it from drying properly.

The best way to remove the enamel from the leg of the mahogany piano case would be to use a felt pad, FF pumice stone, flour and rub carefully until the enamel spot is removed. The pumice stone should then be cleaned off and the whole face of the leg cleaned up and polished with rotten stone and a clean pad. Let dry off and clean up with a good polish.—Ralph G. Waring.

Manual Arts Attracts Students. The manual arts department, at Excelsior Springs, Mo., has experienced a rather remarkable growth in enrollment this year which is attributed largely to a radical change in shop teaching methods.

It became evident that the school shops would have to be closed unless they could produce articles which would prove the practical value of the work. As a result, the beginning classes, with the aid of the older students, began the construction of lumber racks for the tool room, lockers for the gymnasium dressing rooms, cabinets for the science laboratories and desks for the cafeteria, also swings and bicycle racks. The eighth grade has begun the construction of filing cabinets and drawing tables for the drawing classes.

The advanced classes are studying design and making period furniture, with special attention to the application of new finishes.

It is estimated the work of the manual arts students has saved the school board several hundred dollars, as well as saving the community money through the application of certain phases of home mechanics work. Mr. V. L. Pickens is director of the manual arts work at Excelsior Springs.

Machine Shop Work Added. A course in machine shop practice has been added this year at Washington, Pa. The equipment for the work was obtained last year from the Government and includes lathes, milling machine, and drill presses.

A second course in automobile construction has also been introduced. The class is at present working on a Ford engine, grinding valves and scraping bearings. The work covers four 80-minute periods each week.

A new feature has been added in the Continuation School. The noon day lunch is prepared by the girl students as part of the regular work. The lunch costs from twelve to fifteen cents per student. The school is in session eight hours every Thursday, with four hours given to academic subjects and four to shop practice. Mr. Geo. C. Donson is supervisor of manual arts work at the high school.

New Trade School Course. A practical course in sign painting, show card writing and commercial arts work is offered this year at the evening trade school, Brooklyn, N. Y. Instruction and material are free to students.

The entire September, 1921, issue of the Buffalo School Magazine was devoted to the work of the vocational schools. Special articles on vocational guidance by Mr. E. T. Welch, on the rehabilitation of soldiers by Mr. A. H. Bingham, on high sports of the schools' work by Mr. W. B. Kamprath, on the part-time schools by Mr. Wm. J. Regan and a dozen others are included. The issue is illustrated with photographs of classes at work, problems, etc.

A LIST OF LUMBER DEALERS WHO ARE WILLING TO SUPPLY MATERIALS TO MANUAL ARTS AND ENGINEERING SHOPS.

Compiled by Victor J. Smith, Professor of Manual Arts, State Normal School, Alpine, Tex.

(Concluded from October.)

Many instructors in our schools and colleges have experienced difficulty in securing the variety of hardwood lumber necessary to properly conduct classes in woodworking. Local yards are rarely able to solve the problem either in variety of woods or price. The following list of firms has, therefore, been compiled in order to enable such schools to get in touch with the larger lumber dealers in their neighborhood.

Each firm is listed by special permission and the general tone of the letters received in answer to our inquiry was one of friendliness to the school shop and a more than commercial interest in manual arts and engineering woodworking.

The following list of varieties will enable one to identify the stock for sale by any given firm listed. The second part of the list of varieties is only sold by a few companies.

1.	Ash.	23.	Quar. white oak.
2.	Birch.	24.	Persimmon.
3.	Basswood.	25.	Pecan.
4.	Beech.	26.	Poplar.
5.	Cedar.	27.	Pine (white).
6.	Chestnut.	28.	Redwood.
7.	Cherry.	29.	Sycamore.
8.	Cottonwood.	30.	Tupelo (black gum).
9.	Elm.	31.	Walnut.
10.	Cypress.	32.	Willow.
11.	Plain red gum.	33.	Bay.
12.	Quar. red gum.	34.	Box elder.
13.	Plain sap gum.	35.	Buckeye.
14.	Quar. sap gum.	36.	Butternut.
15.	Hickory.	37.	Hackberry.
16.	Locust.	38.	Hemlock.
17.	Mahogany.	39.	Laurel.
18.	Maple.	40.	Norway pine.
19.	Magnolia.	41.	Sassafras.
20.	Plain red oak.	42.	Spruce.
21.	Quar. red oak.	43.	Tamarack.
22.	Plain white oak.	44.	Tropical woods.

Memphis—F. T. Dooley Lumber Co.—1, 4, 5, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 26, 29, 30. Scattered Mills.

Memphis—Geo. C. Brown & Co.—1, 5, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 25, 30. Greensboro, N. C.; Crooked Bayou & Proctor, Ark.

Memphis—Goodlander-Robertson Co.—1, 5, 9, 11, 12, 13, 14, 20, 22, 23, 26.

Memphis—Grismore-Hyman Co.—1, 9, 10, 11, 12, 13, 18, 20, 21, 22, 23, 24, 25, 29, 30 and 31. Pekin, Ark.

Memphis—Jas. E. Stark & Co.—1, 5, 9, 10, 15, 17, 18, 19, 20, 21, 22, 23, 25, 29, 30, 31 and 32.

Memphis—J. H. Bonner & Sons—9, 11, 12, 13, 14, 18, 20, 21, 22 and 23. Jonquil, Ark.

Memphis—L. D. Murelle—1, 3, 7, 13, 14, 18, 19, 20, 21, 22, 23, 26.

Memphis—Mossman Lumber Co.—1, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 26, 29, 31.

Memphis—Philip A. Ryan Lumber Co.—1, 9, 11, 12, 13, 14, 20, 22, 23 and 30. Lufkin, Texas.

Memphis—Rush Lumber Co.—1, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 25, 26, 29, 31. Hackberry, plain and quar. black gum.

Memphis—Stimson Veneer & Lumber Co.—1, 3, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 26, 29, 30, 31 and 32. Helena, Ark.; Huntington, Ind.

Memphis—Tallahatchie Lumber Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 25, 26 and 30.

Memphis—Welsh Lumber Co.—1, 4, 5, 9, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 26.

Memphis—See Maley & Wertz Lumber Co., Evansville, Ind.

Memphis—See G. W. Jones Lumber Co., Appleton, Wis.

Murfreesboro—Earthman Lumber Co.—1, 5, 7, 6, 15, 26, 31 and oak.

Texas.

Austin—Nalle & Co.—2, 10, 20, 21, 22, 23, 27 and pine. Panel and made to order parts. (S)

Beaumont—Beaumont Lumber Co.—10, 11, 12, 13, 14, 19, 20, 21, 22, 23, 25, 30 and pine. Carloads only.

Beaumont—Keith Lumber Co.—10, 11, 13, 19, 20, 22, 30 and pine. Voth & Rockland, Tex.

De Kalb—De Kalb Tie & Lumber Co.—11, 13, 20, 22.

Deweyville—See Peavy-Byrnes Lumber Co., Shreveport, La.

Ewing—H. G. Bohlssen Mfg. Co.—1, 3, 4, 19, red and sap gum and red and white oak.

Grayburg—William Graydom Hardwood Co.—1, 10, 11, 13, 20 and 22.

Houston—Robertson-McDonald Lumber Co.—1, 9, 13, 19, 20, 21, 22, 23, 30, mulberry and pine. Duers, Texas.

Lufkin—See Philip A. Ryan Lumber Co., Memphis, Tenn.

Lufkin—Martin Wagon Co.—1, 11, 13, 15, 20, 22.

Mt. Pleasant—Walton Lumber & Tie Co.—1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 25, 26, 27, 29, 31 and 32. Carloads.

New Willard—King Creek Lumber Co.—1, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 29, 32.

Paris—L. N. Kimer Lumber Co.—1, 3, 9, 11, 12, 13, 14, 20, 25, 29 and 31.

Texarkana—Southern Pine Lumber Co.—1, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 22, 23 and pine. Dibell, Texas.

Wisconsin.

Antigo—Mattefs Bros. Co.—1, 2, 3, 5, 7, 9, 18, 20, 21, 22, 23, 26 and 27. Cabinets and special parts to order.

Appleton—G. W. Jones Lumber Co.—1, 2, 3, 11, 12, 13, 14, 15, 18, 20, 21 and 22. Wabeno, Wis.; Tendall, La.; Wausau, Wis.; Memphis, Tenn.

Marinette—Sawyer Goodman Co.—1, 2, 3, 4, 5, 9, 20, 27, hard and soft maple, 36, 38, 40, 42, 43, rock elm, tamarack, Norway pine and spruce, Goodman, Wis.; Sagole, Mich.

Milwaukee—Geo. W. Waetjen & Co.—Hardwoods and panels.

Milwaukee—John Schroeder Lumber Co., foot of Walnut St.—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 18, 20, 22, 26, 27, 31, 38, 40, 42, 43.

Rhinelander—Masey-Donalson Lumber Co.—Basswood and birch. Carloads.

Wausau—B. Heinemann Lumber Co.—1, 2, 3, 9, 18, 27.

Illinois.

Chicago—John S. Benedict Lumber Co., 419 North Halstead St., 1, 18, 20, 22, 23, 26, 27, 31, 38, 42.

VENEERS AND LUMBER SPECIALTIES.

Companies marked (S) on the long list refer to these firms.

Illinois.

Chicago—Veneer Manufacturers Company—veneers in gum, birch, poplar, oak, pine, spruce, mahogany, walnut, Vermillion and prima vera.

Pekin—Langton Lumber Company—walnut veneer.

Rockford—Litton Veneer Company—plain and figured veneers.

Indiana.

Ft. Wayne—Hoffman Brothers Company—veneers.

Indianapolis—Hoosier Veneer Company—foreign and domestic veneers.

Kentucky.

Louisville — The Mengel Company — African, South American and other tropical woods.

Michigan.

Grand Rapids—Walter Clark Veneer Company—veneers in birch, oak, pine, gum, mahogany and maple. Panels and drawer bottoms.

Grand Rapids—Grand Rapids Dowel Works—dowels, wood novelties and made to order parts.

Missouri.

Kansas City — Empire Veneer Company — mahogany and figured walnut veneers.

Kansas City—Western Veneer & Panel Company — veneers and panels.

St. Louis—St. Louis Basket & Box Company—panels and built up stock in mahogany and domestic woods.

Ohio.

Cincinnati—Ohio Veneer Company—veneers in walnut, mahogany, maple, birch, oak and rosewood. Plain and figured stock. Foreign woods.

Tennessee.

Memphis—James E. Stark & Company—veneers in gum and plain and quartered oak.

Memphis — Stimson Veneer & Lumber Company — veneers.

Texas.

Austin—Nalle & Company—veneers. Made to order stock.

Wisconsin.

Milwaukee—Geo. W. Waetjen & Company—veneers in gum, pine, oak and birch. Panels in stock and made to order.

LIST OF LUMBER DEALERS—GRATIS.

The INDUSTRIAL-ARTS MAGAZINE has just published in pamphlet form the preceding list.

Copies will be sent gratis to any reader and to any manual training instructor who will address the Subscribers' Free Service Department, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

WILL MEET IN MILWAUKEE.

The Vocational Education Association of the Middle West will meet in Milwaukee on January 11, 12, 13, 14, 1922. Up to last year this association had always held its meetings in Chicago. There was a belief that because of its central location it would not be practicable to meet at other remote sections of the territory represented. Last year however, the association ventured abroad. The meeting was held in Minneapolis—on the remote northern edge of the Middle West territory. The sessions were crowded to capacity, delegates were present from every nook and corner of the section, enthusiasm ran high and the net result showed a gain rather than a loss. The membership at the close of the Minneapolis meeting was greater than at the close of the previous meeting in Chicago, even though the latter was a joint meeting with the National Society for Vocational Education. Any doubts as to the place of this association in the hearts of the advocates of vocational education were dispelled. The convention is not a mere "pleasure jaunt" or a midwinter vacation. It is rather a four-day post-graduate extension course for students of vocational education. Superintendents and directors of vocational education recognize this value and send members of their teaching staff as delegates, with expenses paid, believing that the value to their schools is more than equal to the expense incurred.

The convention of the association contains in its program, in additon to the "inspirational addresses" valuable results of long and careful study by committees which have been at work during the year. These reports are discussed and results are published in monograph form. "Monograph No. 1, series 1921" has just been announced by the publication committee. This deals with a report of the "Social Science Committee" and represents the cumulative result of three years' work. It contains thirty pages and includes a series of suggested lessons for high schools and industrial classes. This is issued to members free. The quality of the report may be judged from the personnel of the committee. Ruth Mary Weeks, whose study along this line is known the country over acted as chairman; Prof. John R. Commons of the University of Wisconsin, and Prof. Frank M. Leavitt, Assistant Superintendent of Schools, Pittsburgh, were the other two members of the committee. The results were tested out in various schools through cooperation of many individuals.

Other committees are at work for the coming meeting. Last year agricultural education was given a very prominent place on the program. Prof. F. W. Stewart, State Supervisor of Agricultural Education, Columbus, Ohio, is chairman of the committee this year, and the impetus given this subject last year will show excellent results at the coming meeting in Milwaukee.

C. M. Yoder who is chairman of the committee on Commercial Education, reports progress on some interesting investigations and study by his committee.

An exhaustive study on the problems of vocational education as related to "Women in Industry" is being prepared by a committee of which Miss Elizabeth Fish of the Vocational School of Minneapolis is Chairman.

At Minneapolis the sections devoted to Vocational Guidance were filled with interesting discussion. It was felt by everyone in attendance however that the position of the vocational guidance movement was materially strengthened, and due allowance made for its many valuable features in the face of previous attempts to discredit its results. With Harry D. Kitson, of the Department of Psychology at the University of Indiana, as Chairman of the committee, there is no question but that the committee with its report at Milwaukee will "meet all comers".

The Industrial Education Committee, under W. F. Faulkes, Supervisor of Trades and Industries of the State of Wisconsin may be expected to present a valuable contribution to this topic.

Miss Martha H. French of the Household Arts Department of the State Normal School, Ypsilanti, Mich., is chairman of the committee on Home Economics, which has for the past two years been at work on some particularly interesting problems connected with this line of education. The report may be looked for as a distinct contribution to the subject.

Then there is the Committee on Membership. Everyone in the middle west is a member of this committee. This means *you.* Sit down at once and write the Secretary, Leonard W. Wahlstrom, 1711 Estes Ave., Chicago, and give him the names of everyone you think should be a member of this live association. A dollar will pay for a membership, and in addition, will bring a copy of the valuable report of the Social Science committee mentioned above, as well as future issues of the monographs. Get busy, and make your plans to

"Meet Me in Milwaukee in Mid-Winter"

January 11, 12, 13, 14, 1921.

Trade Classes Organized. The industrial department of the Gary, Ind., schools has organized special trade classes to meet the needs of students who have returned to full-time schools after being in employment and in continuation school. Special adjustment of courses has been made for students above 14 years whose needs can be better served in trade classes.

The courses offered for boys comprise machine-shop practice, foundry and forge work, with mechanical drawing and the related subjects of shop arithmetic, industrial geography and business English. The courses for girls include home making, with special adjustment of courses preparing for telephone and office work.

The INDUSTRIAL-ARTS MAGAZINE

DECEMBER 1921

The Bruce Publishing Company
Milwaukee-Wisconsin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INDUSTRIAL-ARTS MAGAZINE

Volume X DECEMBER, 1921 Number 12

AN ELEMENTARY CLASS IN MODELING AT THE NORTH BENNET STREET INDUSTRIAL SCHOOL, BOSTON.

Education in Decorative Plastic Art

George C. Greener, Boston, Mass.

IT is a blessing that in this often abused age of machinery, there are still some trades open to a man of initiative in which the work of his hands need not be remote from the interest of his mind. Joy of creating, of using imagination and individual ideas, pleasure in line, form and color, and the satisfaction of making objects both useful and ornamental—all may be found in the wide and varied field of decorative plastic art.

Advantage of Industrial Course.

Such a craft, though it be also an art, cannot be learned at the academies. The courses in modelling which are given by the academic art schools, educate the student for free creative activity, but do not prepare him for work in decorative art shops. On the other hand, the usual and direct way of approach to the craft is to enter a shop when young, as an unskilled apprentice to older workers in carving, modelling and the like. To be sure even the lowest stages of an art-craft are absorbing and depend on individual skill, in contrast to unskilled factory labor. Yet the apprentice who has never learned to draw or to handle clay cannot possibly grasp the principles of the craft or progress as fast as one who has had some elementary schooling and unless he has exceptional talent, he is doomed forever to work under a superior. For the man who is artist and craftsman in one, that is, he who can invent his own design, will be at the head of a decorative art establishment, and supervise and finish the work of his helpers. A boy who chooses plastic art for his lifework, though he may not have the remotest desire for fame and great artistic achievement, will yet have the natural ambition to rise to the top within his own sphere. As on the one hand most young men who would be likely to enter into this calling have neither the leisure nor the inclination to take an academic course such as the art schools offer, and as on the other hand mere apprenticeship without study and training does not lead to excellence and the desired success—it would be sad indeed if no compromise could be found. Yet such a middle course between abstract academic study, and immediate shopwork is offered by the North Bennet Street Industrial School. Courses in clay modelling are there given to school children from the fourth grade on through the eighth. But it is particularly the course in plastic art for adult pupils, given two evenings in the week, that prepares men for practical work in decorative art shops and at

the same time gives them a foundation for creative activity which may lead to future independence and leadership.

The Industrial Instructor.

The instructor, who conducts this course, is himself at the pinnacle of the plastic decorative art work in Boston. He is an accomplished artist, a versatile craftsman and the director of his own workshop. More than any academic instructor, he is peculiarly fitted to teach those who cannot afford a leisurely education and who aim toward practical accomplishment. Yet he is the first to insist that without education and training supreme achievement, even in practical art, is unlikely if not impossible. In his own boyhood, while he was still attending the grammar school in the morning, he went to one art school in the afternoon and to another in the evening—not, indeed, with any thought of future profit, but from sheer love of the work. This disinterested devotion in early youth won for him not only inner contentment but substantial outer rewards.

Handicap of the Uneducated.

It is a significant fact that older men who work in this instructor's own shop are taking his evening course. They have found that in spite of the constant occupation and intimate familiarity with their craft, they have missed something—the elusive something which prevents them from achieving what their diligence and earnestness seem to deserve. They have missed education. For years they have carved wooden angels and Madonnas, or chiseled acanthus leaves out of marble; but they may not know a Doric column from a Corinthian. The architect who gives orders for church or library decorations cannot confer with them, because they would not understand him. Therefore they must always be told by their more educated employer to do this and to do that, without hope of becoming their own task-masters. The training which these older men are trying to acquire now because they have realized the disadvantages of its lack, young men may wisely secure before they enter the same vocation.

The North Bennet Street Industrial Course.

The course which is offered at the North Bennet Street Industrial School follows the lines of activity which the young artist may expect to pursue in his later practical work. When an architect orders a decorative panel, the artist first draws the design for his sculpture, then makes a clay model which is shown to the customer; not until this pliable clay model, which can easily be changed, has proved quite satisfactory, is work begun upon the final product in wood, stucco or marble. Thus, accordingly, in the evening training course in woodcarving, the pupil is taught first to draw his design, then to make a clay model from the given pattern and finally to translate this design accurately into the more difficult medium. Of course, a certain ability to draw must be taken for granted in the modelling course; but the North Bennet Street Industrial School plans to offer drawing instruction also which shall precede the course in plastic art. Training in clay modelling is gained by copying from classic models, and in this way young men who may later never have leisure or initiative to study, will learn at least the rudiments of the historic language of lines and forms.

Benefits of Evening Course.

The instructor does not pretend that such an evening course can take the place of apprenticeship in a workshop with its constant practise. But he knows that the apprentice who has already passed through a course

SOME PIECES PRODUCED BY AN EVENING MODELING CLASS.

PART OF AN EXHIBIT OF STUDENTS' WORK, NORTH BENNET STREET INDUSTRIAL SCHOOL, BOSTON.

in modelling and wood-carving not only will learn faster than his less favored companion, but enters his craft better equipped for future independent achievement. If the young apprentice has not been able to take the course before he begins practical work, he may do so in the evenings of his working week. Then he will find the skill won by daily practise an advantage in his study, and the instruction and training offered in the course of great value in widening his perspective and deepening his attitude toward his own lifework in the school. Furthermore, he can be given a more complete training than in the comparatively one-sided work of his apprenticeship into which he may be forced by market conditions.

Forms of Expression.

The young man who has learned accurate clay modelling may associate himself with wood-carvers, with workers in stucco, or sculptors of stone. Some workshops include craftsmen in all mediums, but these are exceptions. The venerable but ever youthful art of wood-carving is represented in Boston by such firms as Ross Co., Forg & Miller, John Evans, Emery & Ross, and Charles Emery. If a young apprentice entering one of these firms has learned clay modelling, this schooling cannot fail to be an advantage, as models in clay are always made first, before the wood-carving is begun. If he has taken lessons in both clay modelling and wood-carving, he will have a double advantage.

Stucco.

For those who plan to work in stucco, the clay modelling is essential, as it represents the only artistic activity in this work, indeed, the final medium is gained through the mere mechanical process of casting. This less noble, but more accessible and adjustable medium is much in demand, and prospective workers in stucco should find ample opportunity in this field.

Finally the sculptor proper, who hews and chisels figures and ornaments from stone, cannot dispense with the training in clay modelling. The technique of mastering the stone cannot be taught in a school, because a yard is necessary in which to work upon the bulky blocks; this largely muscular accomplishment must be learned directly at a workshop. But the real artist, the director of the shop, composes his statue or decorative design in clay, and leaves the hewing of the marble or other stone to his helpers. By means of a pointing compass, the apprentice takes the exact dimensions of the original clay model and copies it in stone; then the artist applies his own chisel to the marble product and finishes it with the last individual and decisive touches. It is self-evident that a normally ambitious boy who enters—say the shop of John Evans or the Johnson Marble Co. of Boston, would rather play ultimately the role of the composing, directing and finishing artist than to remain satisfied to the end of his days with the rough work of stone-cutting. Training in composition, drawing and clay modelling is therefore as helpful to one whose medium will be marble as to those who intend to work in stucco or carved wood.

As the better educated have a greater opportunity for advancement, so they have also a better chance for increase in wages. In a typical shop, a young man has the chance of earning from $20 to $75 a week—if he enter with some previous art education. Otherwise unless he has exceptional talent, he must be content with less for some time, and do the best he can to compete with those who have had better advantages.

Attractiveness of Decorative Plastic Art.

The career of an artist, or craftsman, in the field of decorative plastic art offers many inducements, outside of the economic aspect. A boy with any sensibility must feel the difference between working in a noisy manufacturing plant where he represents only one small wheel in the big impersonal machinery, and creative work which he can watch grow from beginning to end, and in which the significance of even his own humble share can be fully estimated and appreciated. The beauty of the finished product will depend on the

harmonious cooperation of all who have laid hands upon the wood, clay or marble; and the youngest apprentice cannot fail to take pride in his share of its perfection. Moreover, instead of being surrounded by whirring machines—the craftsman sees round about him half-finished angel's heads, panels with carved rosettes or palm leaf designs, clay models still moist and pliant, or else merely the mute material which, however, is ready to burst into eloquence under the skilled touch of his hands. There is no monotony here among the jars of gold and silver paint, the palettes with bright colors, the seemingly infinite variety of tools which only he who uses them can understand; there is no dullness, no hopelessness. Yet if a craft is so attractive at the bottom of the career—how much more satisfying it must be at the top! This should be considered by every man who chooses to enter the field of decorative plastic art, and such consideration must lead inevitably to a training-course in drawing and clay modelling.

It will thus appear that such a training-course in modelling and wood-carving as is offered by the North Bennet Street Industrial School is valuable for boys and men who must enter the ranks of practical wage-earners, but who have chosen or contemplate choosing a craft which busies alike hand, mind and imagination of the craftsman and which may lead, with the necessary training and education, beyond craftsmanship to original art. The training-course bears directly upon the economic advantages of the worker in decorative plastic art, and upon the opportunities for his advancement which may culminate in his independent management of a workshop and, at the same time, in creative achievement. And the course, by laying a foundation in clay-modelling which has been found to be indispensable in all kinds of plastic art work serves equally the future wood-carver or modeller or sculptor.

PUBLIC SCHOOL CLASSES—CLAY MODELING.

Grade V.

I. Impression work (with thumb).
- leaves
- seeds
- sticks
- objects brought by pupils

II. Applied forms
- Resulting in
  1. Tiles
  2. Borders
  3. Designs for nail-heads, etc.

III. Simple pottery
- Shaped from the ball
- Built up with coils
- Built up with tablets of clay

  } Bowls, Candlesticks, Pen tray, Ink well, Boxes, etc.

- Use for decoration—the symbols: rain, sun, river, mountain, etc. (incised designs.)
- Polish after Indian fashion
- Color with earth paints
- Incised designs—Pupils cut paper designs at home for tiles

IV. Nature work in high relief
- leaf
- flower

V. Illustrative work—Fables, etc.—In relief
- In the round

VI. Ten minute memory sketches

VII. Ten minute poses

Voluntary and spontaneous work encouraged.

Grades VI, VII and VIII.

Constructive Work.

I. From dictation
- Tiles built
- Tiles rolled
- Studies in relief
  1. The ball
  2. The Rosette

  } Prints and photographs shown; Pupils think of possible use for such designs; Pupils think where they have seen them

II. Applied forms — using larger forms than in the lower grades. Pupils express their own ideas as to elevation, shape, centre, etc.

  } Wreath; Rosette; Finials; Design to fill given space: a. regular, b. irregular

III. Work from Cast.
- In relief
- In the round
- Translating from the round to relief.

IV. Work from Nature. In relief—aiming at good composition

  } The onion sprouted; radish; bananas; leaves, flowers — of large form

V. Designs for
- Door knockers
- Door handles
- Drawer pulls
- Wreath
- Brackets

  } Study pictures and the M. F. A. Metal exhibit if possible

VI. Pottery
- Coiled
- From tablets

  } Flower pots; Candlesticks; Vases, jars, with covers and handles; Boxes, tiles, plant boxes; Food dishes for dog, cat, bird; Child's bowls

Decorate only well made pieces of good form

Aim at good form without decoration

VII. Illustrative work in relief and in round
- St. George and the Dragon
- The Tar-baby
- The fables "Waiting" "Storm," etc.

  } Fireplace tiles fitted into frame; Window box tiles.

VIII. Imaginative work
- Grotesque masks—Dragons—Dolphins—Gargoyles.

IX. Lettering—Mottoes (See Mr. Mercer's titles)

X. Memory work — repeating a piece previously molded.
- Ten minute poses
- Ten minute memory sketches

  } 1. Something the teacher has just modeled. 2. Something seen during the week. 3. Something the teacher has asked to be observed.

According to season:

Foot-ball player, Thanksgiving, Christmas, Snow Scenes, Circus, Storm.

Observations and reports. Statues and Ornament seen in the street.

Collections for individual scrapbooks and the School Bulletin Board. News items and prints from magazines and newspapers.

Exercises: Think of some statue to be made for the city or nation. How would you do it? Take the pose. Why choose that pose?

Take the pose of any statue you have seen during the week. Who modeled it?

All spontaneous efforts encouraged.

Evening Classes in Clay Modeling.
Advanced Modeling.

Large work from the cast
- In high relief
- In low relief
- In the round

To be done well enough to be cast

- Enlarge details of ornament or
- Reduce the size

Model from flat copy

To be done well enough

Model from Memory

to be cast

Sketches

Designs for—
- Drinking Fountain for animals, human folk
- Clock case
- Flag holder
- Doorway
- Electric lights upon the street corner
- Electric lights upon a building
- Letter box (Thing of the meaning that may be ex pressed)
- Fire alarm box.
- Gate post for—
  - School house
  - Garden
  - State house

Lettering—
- The name of a building
- A memorial tablet
- An inscription

Study—
- Styles of ornament and periods
- Talks on and visits to neighboring museums
- Lives of sculptors, etc.

Plaster Casting—
- Slip moulds
- Waste moulds
- Gelatine moulds
- From pupils work
- From life

Architectural Modeling.

Copying in clay from leaves (natural and ornamental).

Working from memory and from drawings and prints, enlarging and reducing details.

Instruction in the styles of ornament used on furniture and buildings of the different periods and countries.

Advice as to what kind of word is done by the different firms of the city.

Instruction in doing such work so that pupils may get and keep employment in such firms.

Special advice and instruction to meet particular cases.

Industrial-Arts and Prevocational Education in Our Intermediate and Junior-High Schools

ORGANIZING AND CONDUCTING REPRESENTATIVE ACTIVITIES

(ARTICLE II—Concluded)

A. H. Edgerton, Indiana University

Types of Industrial Arts Conducted in Smaller Communities—An Illustration.

Diversified Industrial Activities at Hastings, N. Y.[10] In the *seventh grade* at Hastings, N. Y., concrete construction is taken up as the main activity. Brief talks are given on the manufacture of cement early in the course. This naturally follows the story from the rough rock to the finished products, as developed in the shop. The forms for the simple concrete products involving mass construction are made from wood by the pupils. Some of the boys work individually on problems needed for the home, while others work in groups on larger projects, many of which are made for the school.

Running along parallel with the construction work, short talks are also given on the proper methods of preparing the forms for concrete, the kind of lumber to use, etc. The ingredients required to make concrete, their selection for desired mixtures, and methods of testing likewise are taken up and followed by the actual proportioning of materials, mixing, placing, depositing and protecting. After having completed projects in mass construction, reinforced and hollow construction problems are attempted. It has been the aim to have this work in the school shop of the same nature as the smaller construction work in the industry but as this is not possible in all cases with a small amount of equipment, trips are made occasionally to places where concrete construction is in operation. Notes are taken on the practical ways of doing this work on a larger scale.

In the *eighth grade* at this school, sheet metal work is introduced. Starting with the making of a simple biscuit cutter from a discarded soup can, the boys learn the principles of soldering. They have the experience of cutting and folding tin and soon become familiar with the metal working tools. A cup is then made, and the method of making a flange, or turning the edge, is explained. Coffee pots or watering cans have been found to be good problems for bringing in riveting. The making of spouts affords splendid opportunity for planning developments, as does the making of a funnel. Then after making a frying pan with a rolled edge from a round gallon can; each boy selects his projects and shows no end of interest in making up such problems as match boxes, lanterns, dust pans, stationary boxes, ash trays and such toys as automobile trucks, tractors, steam rollers, locomotives and boats. Figure III shows a few of these sheet metal problems.

The material for this work during the past year has consisted mostly of discarded tin cans. Several thousand of these have been brought in by the boys. Aside from the pleasure and knowledge derived from the actual making of the tin products, perhaps the greatest satisfaction lies in the fact that the boys are

[10]Contributed by Wm. H. Peters, Head of Industrial Arts Department, Hastings, N. Y.

using materials which usually are thrown away. You might say that this is making "something out of nothing" and thus eliminating bills which would otherwise be incurred. In this work the boys use their own initiative after being shown the simplest principles. Fig. IV shows a boy making bathroom fixtures for a doll-house. The combination of simplicity with the chance to use creative ability has proved of untold value. There was such a great amount of interest taken in this kind of work by the boys that many have asked to do extra work. As a result, many ingenious projects, some of which required a knowledge of mechanics, have been worked up.

In the *ninth grade* course electricity is introduced and sets of apparatus are made in order to cover the important principles of electricity. The constructions are made as simple as possible in order that the theory, given in talks parallel with the shopwork may be clear. As a first project, a simple telegraph sounder is made from a scrap of wood for a base, two twenty penny nails for the core of the magnet, a piece of tin (from an old tin can), which is folded and shaped for the armature. The key and switch are made from scrap pieces of tin and wood. When two boys have completed these instruments, they can get great interest in setting them up to form a complete telegraph system between two rooms. Next a buzzer is made of as simple construction as the sounder already described. This is followed by the making of a push button, which is as easily constructed as the key mentioned above.

Later a toy motor is introduced with good results. The experience of adjusting and hunting electrical trouble in this problem affords enough incentive to guide boys through the principles of the motor. After completing these problems, they select and make projects which are of particular interest to them. Many ingenious instruments have been turned out in the form of shocking coils, burglar alarm, wireless sets, etc. The boys seem to take a great interest in these problems, as well as in working out different experiments on an electro board which contains a number of possible hook-ups.

TYPES OF JUNIOR-HIGH SCHOOL INDUSTRIAL ACTIVITIES IN LARGE SCHOOL SYSTEMS.

Seventh Grade Industrial Arts at the Ben Blewett Junior High School, St. Louis, Mo.[11]

The shopwork at the Ben Blewett Junior High School, in St. Louis, Mo., is organized into two divisions: First, the seventh grade which has compulsory shop courses, and the eighth and ninth grades which are elective. After a boy has taken a year in the elementary shop, he then has an opportunity to choose between the technical arts, science, commercial, art, and classical courses. This report will, therefore, only discuss the *seventh grade shopwork and study.*

[11]Contributed by G. H. Hargitt, in charge of industrial-arts Classes at St. Louis, Mo.

This community, which is entirely residential and draws from a class of students whose parents, to a large extent, will encourage higher education, presents a problem which is quite different and difficult. Most of these children live in apartment houses, where they are deprived of the privileges of tinkering and experimenting in shops of their own. It is believed that all boys want or should have this experience, and for this reason, we are giving them this one big chance of their school career for guided experimenting.

We try to make a cycle of the material with which they work as much as possible, by encouraging that they first of all use wood as their medium of construction. This is followed by the use of sheet metal and soldering. Casting of soft metal in die-casting molds follows this, and finally they work in concrete and in electricity. We hope to have each and every boy come in contact with all these different media of construction some time during his work in the seventh grade.

The pupil, too, has the actual shop experience, with the added responsibilities of having complete charge of the issuance of tools in the tool room by means of a check system. He is made to feel that he is responsible for the tools and that he should see that they come back to the tool racks in as good condition as when they were given out. These are just further steps of the aim for making the boy feel that he is a part of the governing body, as well as the one to be subject to rule and order.

Wherever possible, it is the endeavor to have the work so arranged that the boys make use of their projects to help them pass their merit badge tests for the scout organizations and for clubs. All these things solicit closer cooperation of the boy by making him feel that there is a connection between all of these activities. A few excellent projects of this type are the chemistry sets, the heliograph, the telegraph set, the wireless, the naturalist's box, the level, and the chart board having the compass for charting the hikes made by the club.

Another project which proved its merits last spring was the organization of a Yacht Club previous to the races between the Shamrock and the Resolute. We studied the merits of the many types of sailing craft with reference to speed and ability to weather a storm. The boys became so enthused that they even conducted a few races among themselves and then discussed the merits and faults of the various boats.

The organizing of a Railroad Club, which ran through the whole of last year, was the most successful of our projects, not so much from the skill and technique of the project, as from the vast amount of information and satisfaction the boys derived from it. We elected the officers of the Railroad Corporation with its executive board, and this in turn had its subdivisions. There was a superintendent of road construction; a superintendent of block signals; one of the construc-

tion of cars; one for the engines, and one for the bridges. They met and decided upon the scale upon which to build the model railroad. A scale of one-half inch to the foot was agreed upon. They then proceeded to choose the helpers and assistants from the remainder of the club members and began on the development of the drawings and plans. A book of plans and specifications published by the Railroad Builders' Supply Companies, was procured and used as a guide. The boys made several trips to the railroad yards, switches, bridges and signalling towers. After watching the different operations of the parts in which they were interested, they brought information to the club which aided them in the construction of their projects. The benefits derived from these studies were not local entirely, as the boys in their enthusiasm solicited the interest and curiosity of the parents to the extent that many of them visited the meetings of the club and contributed of their knowledge and skill to aid in the construction of the main project.

Industrial Department of the Washington Junior High School, Rochester, N. Y.[12]

At Rochester, N. Y., the Washington Junior High School gives three types of industrial courses, which are called general try-out industrial, technical and vocational. The *general try-out course* is for boys in the 7A grade, since a general requirement in this grade is that every boy shall have one period of shopwork a day. The aim of this work is to give the boy a general idea of what industrial work is like, so that he will be able to make a more intelligent choice of his course when he enters the 8B grade. The *industrial technical course* fulfills a double purpose. It is both a prevocational training period and a general industrial information course. This course is elective for boys in the 8B grade or above, and it differs from the regular academic "foreign language" course only in the fact that one period a day of shopwork is substituted for the foreign language. The boys spend one term in a certain shop and then change to a different shop for the next term, so that at graduation from the Junior-High School they have a definite knowledge of at least five different kinds of industrial work. This course is preparatory for the regular high school and a *"cross-over"* may be made to other courses at any stage without loss of time.

The aim of the *Vocational Course* is primarily trade training, but, after completing a two years' course in this department, a boy may enter the Rochester Shop or Trade School and continue his work for three years, at the end of which time he obtains the State Industrial High School Diploma. A boy may enter this course at any time during the Junior-High School attendance provided he is over 14 years of age. Upon entrance, the boy and his parents choose the trade which he wishes to follow. He is then given a ten weeks' intensive try-out period in that particular trade. If he shows ability and, in the judgment of the instructor, will "make good", he continues in that kind of work for two years. If, on the other hand, the instructor believes that the boy is unfitted for the particular trade which he has chosen, he is then given another intensive try out in some other type of work. This try out scheme is carried on until the boy finds his niche or until it is definitely decided that he is by nature unfitted for industrial trade work. This course varies greatly from the industrial technical in that the boys do not carry on the regular junior-high school work. The day is divided into three hours of shopwork, one hour and a half of bookwork, including English, history, civics, and hygiene, 45 minutes of related shop mathematics, and 45 minutes of related mechanical drawing. It should be understood that the boys in this course are those who intend to drop out of school at 16, or before, and who desire an intensive trade training before going to work. Last spring over 70 per cent of the boys in this department were beyond the legal age for leaving school, and it is safe to say that nearly all of them would have left had they not been receiving definite trade training.

In order to care for these varying types of shopwork, the organization of the industrial department is somewhat complicated. Nine shops with eleven teachers now take care of all shop work. This is accomplished by using certain shops for vocational work half a day and for try-out work the remainder of the day. In addition to the shop teachers, the industrial department has two instructors for mechanical drawing and one for shop mathematics. At the present time, machine shop, electricity, and automobile repair are strictly vocational shops, while printing, mill work, pattern-making, sheet metal work, and painting and decorating are vocational one-half day and used for technical and try-out work only. One teacher in mechanical drawing is handling vocational classes only, while another is giving part vocational and part try-out drawing. The teachers of shop mathematics and vocational bookwork are handling strictly vocational groups. In no case are vocational boys and try-out boys combined in the same class.

The actual shopwork given in both try-out and vocational classes is done on standard practice machines and, so far as possible, parallels actual factory conditions of the better type. All work given is practical and usually of a productive nature. Production, however, takes a subordinate position, as it is never allowed to interfere with the all-round development of the boy. The industrial department in the school after all, is essentially a school rather than a factory.

It should be explained that these brief reports dealing with three widely varied types of successfully organized industrial arts courses at Hastings, New York, at St. Louis, Missouri, and at Rochester, New

[12]Contributed by R. Parkhill, vocational coordinator, Rochester, N. Y.

York, (as well as the several carefully planned and tried courses, units, and projects which are to appear in the next and last article of this series) were collected for the 1921 Yearbook by the Industrial Arts Committee[13] of the National Society for the Study of Education. Since it did not prove expedient for the Society to publish Part III of its 1921 Yearbook, which was to have included these suggestive contributions, it has been recommended and urged that, if necessary, this report on experiments for developing industrial courses and projects to meet the needs of early adolescence should be revised for publication in one of the leading current magazines. In order that all concerned might derive the most help from these valuable courses and projects, it has been decided to present them in connection with the findings and implications resulting from this investigation of 379 intermediate and junior-high schools.

While it is encouraging to note these marked improvements in methods and procedure, it certainly would be unwise at this time to consider any sterotyped plan as more than tentative. These promising results should point the way for further experimentation, which is certain to make more reliable comparisons and measurements possible. If industrial arts courses are to continue to occupy an important place in the program for general education, the relative possibilities in the different plans for realizing common objectives must be determined more scientifically than heretofore. Our future practices should be based upon established fact as far as is possible rather than chiefly upon opinion, which naturally is variable. In other words, there apparently is an increasing need for scientifically determining how to modify our present methods in order to have seventh, eighth, and ninth year boys learn most effectively and economically.

[13]The Committee appointed to collect these successfully tried units was made up of L. A. Herr, G. H. Hargitt, and A. H. Edgerton, Chairman.

(To be continued)

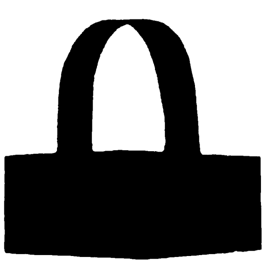
Boxes and Baskets

Miss S. E. E. Hammond, Springfield, Mass.

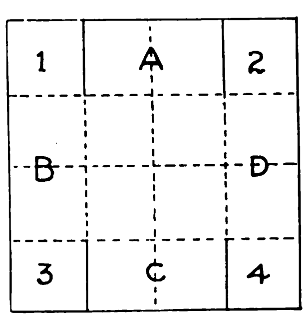
Basket No. 1.

Material:
- 1 pc. green paper 6"x6".
- 1 pc. green paper ¾"x9".
- 4 pc. red paper ¾"x2".

Fold green paper 6"x6" into 16 squares. To do this lay the paper on desk with edges parallel with edges of desk. Fold top edge to bottom edge. Unfold. Fold top edge to fold. Turn paper half way round. The folded edge is now at bottom of paper. Unfold. Fold top edge to fold. Unfold. Turn paper one quarter way round. Repeat folding to form three other folds perpendicular to first three folds.



BASKET No. 1.



-1-

Cut as shown in Illus. 1. Dash lines indicate folds, drawn lines indicate parts to be cut. Paste red paper ¾"x2" on oblong A. Repeat with other red papers on oblongs B, C, and D. Paste squares 1 and 2 on oblong A. Paste squares 3 and 4 on oblong C. Paste green paper ¾"x9" on inside of basket for handle placing ¾" end at bottom of basket.

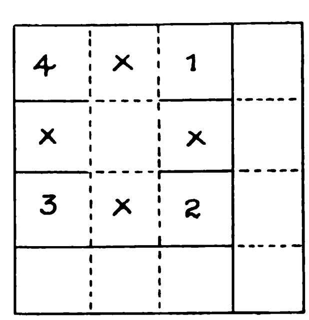
Basket No. 2.

Material:
- 1 pc. red paper 9"x9".
- 1 pc. red paper ½"x9".
- 1 pc. red paper ¾"x3".
- 1 pc. dark green paper 1"x4".

BASKET No. 2.

BASKET No. 3.

Fold red paper 9"x9" into 16 squares. For directions see basket No. 1. Cut paper as shown in Illus.2. Dash lines indicate folds, drawn lines indicate parts to be cut. Fold dark green paper 1"x4" on short diameter. Keep folded, fold again. Paper is now 1"x1". Cut



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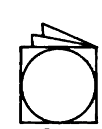


-2A-

irregular form by cutting off corners. Illus. 2a. In like manner fold and cut red paper ¾"x3". Paste four red papers on four green papers. Paste these on squares marked X. Illus. 2. Paste square 1 to square

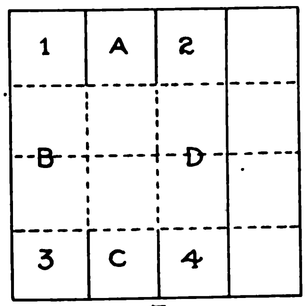
2 and square 3 to square 4. Illus. 2. Paste red paper $\frac{1}{2}''$x9" on outside of these two squares to form handle. Paste two decorated squares to two sides of basket.

Basket No. 3.

Material:

1 pc. gray paper 9"x9".
1 pc. gray paper ¾"x9".

Fold gray paper 9"x9" into 16 squares. Cut as shown in Illus. 3. Using colored crayons place designs



-3-

on surfaces A, B, C, and D. Paste square 1 on square 2. Repeat with squares 3 and 4. Paste end squares A and C. Paste gray paper ¾"x9" to inside of long sides of basket for handle.

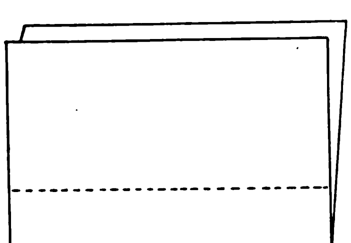
Basket No. 4.

Material:

1 pc. colored paper 9"x12".

Fold colored paper 9"x12" on short diameter. Keep folded, fold folded edge over about 2". Unfold

BASKET No. 4.



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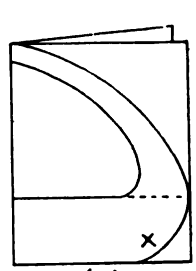


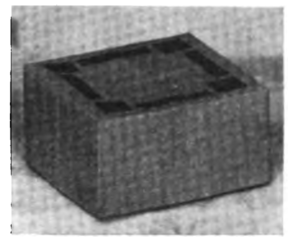
-4A-

last fold. Illus. 4. Fold on short diameter. Paper is now 4½"x6". Cut as shown in Illus. 4a. Unfold to basket shape. Paste edges marked X. Apply suitable decorations using crayon or cut paper units. Basket may be filled with free-hand cuttings of fruits and vegetables, sprays of Christmas greens, or spring flowers.

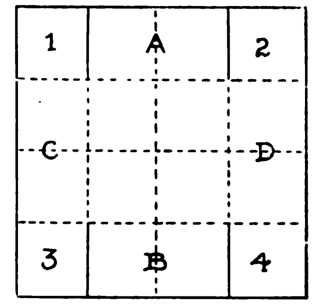
No. 5—A Box.

Material:

1 pc. colored paper 6"x6" (cover).
1 pc. colored paper 5¾"x5¾" (box).



BOX, No. 5.



-5-

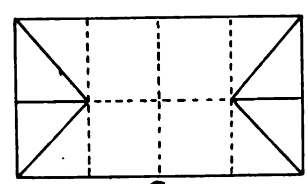
Fold colored paper 5¾"x5¾" in 16 squares. Cut as shown in Illus. 5. Crease folds well. Paste squares 1 and 2 on oblong A. Paste squares 3 and 4 on oblong B. Fold and cut colored paper 6"x6" as shown in Illus. 5. Apply decoration to four center squares which form top of cover, or to four oblongs A, B, C, D, which form sides of cover. Use crayon or cut paper designs. Paste cover same as box.

No. 6—Basket.

Material:

1 pc. green paper 4"x8" or 6"x12".
2 pc. red paper 1¼"x2¼".
1 pc. red cord 30".

Fold green paper 4"x8" or 6"x12" on long diameter. Unfold, fold on short diameter. Unfold, fold on short edge to short diameter fold. Unfold. Repeat with opposite short edge. Paper is now divided into eight squares. Cut as indicated in Illus. 6. First cut ends of long diameter, then fold and cut diagonals of squares. From one piece red paper 1¼"x2¼" cut tree and box. Illus. 6a. Using this as a pattern cut tree from second red paper. Paste two trees on sides of basket. Place end triangles one over the other with diagonal edges to folds, punch two holes in each end of basket, thread in cord and tie. Handle is double cord. Cut off extending ends of triangles.



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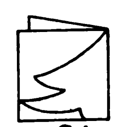

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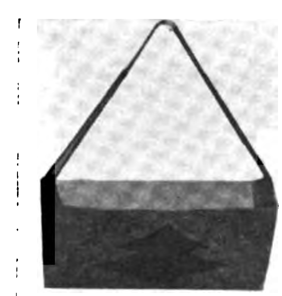
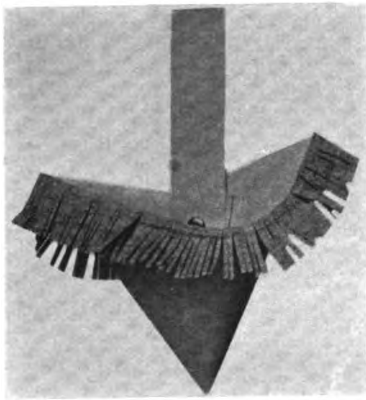


BASKET, No. 6.

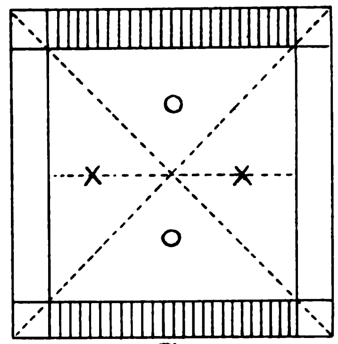
No. 7—Fringed Triangular Basket.

Material:

1 pc. light green paper 9"x9".
1 paper fastener.



BASKET, No. 7.



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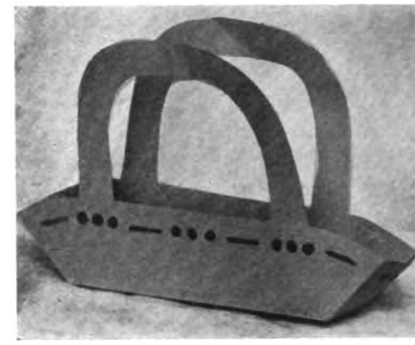


BASKET, No. 8.

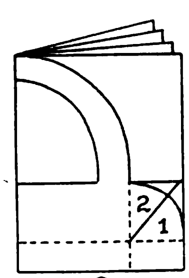
Fold light green paper 9"x9" on one diagonal, unfold. Fold other diagonal. Draw 9" line 1" from and parallel to one 9" edge. Repeat for other three 9" edges. Cut off one oblong 1"x9". Illus. 7. Cut off opposite oblong 1"x9". Using colored crayon color any bright color two remaining oblongs 1"x9". Fold paper on short diameter with colored oblongs on inside. Fold colored oblongs to outside, slash each oblong in fine and even slashes, cutting to the fold. Fold two triangles marked X inside triangles O. Fold one cut off strip 1"x9" on short diameter. Lap two folded inside triangles and fasten to them with paper fastener folded strip 1"x9" for handle.

No. 8—Oblong Basket.

Material:

1 pc. light colored paper 9"x12".

Fold paper 9"x12" on short diameter. Keep folded and fold over folded edge about ¾" to form oblong ¾"x9". Unfold last fold. Paper is now 6"x9". Fold on short diameter. Paper is now 4½"x6". Cut paper



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as indicated in illus. 8. Cut open edges first beginning horizontal cut about 2½" from lower fold of paper, then cut upper edge of basket. Now cut inside of handle. Care should be taken to keep upper edge of basket 2½" from folded edge and width of handle even. Cut diagonal. Round corners of basket as indicated. Unfold basket, crease well folds at bottom of basket. Decorate sides and ends using crayons or cut paper units. Paste parts corresponding to 1 inside parts corresponding to 2. Illus. 8.

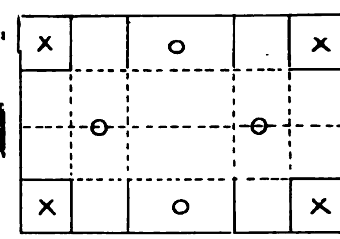
No. 9—Popcorn Box.

Material:

1 pc. dark green paper 6"x9".
4 pcs. red or white paper ¾"x2½".
1 pc. red or white cord or yarn 26".

Mark off 9" edge of dark green paper 6"x9" into three 3" lengths. Repeat on opposite 9" edge. Draw 6" lines connecting opposite points on 9" edges. Illus. 9. Fold paper on these lines. Fold one 6" edge to near 6" fold. Unfold. Repeat with opposite 6" edge. Fold paper on long diameter. Unfold. Fold one 12" edge to middle 12" fold. Unfold. Repeat with opposite 12" edge. The paper is now divided with eight squares on each end

BOX, No. 9.



-9-

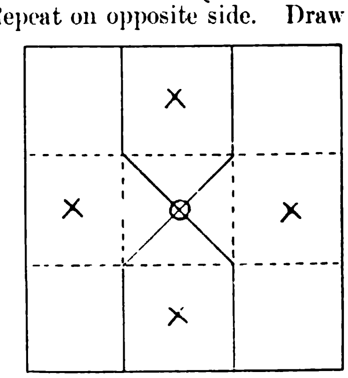
and four oblongs in middle. Cut out four corner squares marked X. Finish cutting as shown in Illus. 9. Paste oblongs of red or white paper ¾"x2½" on oblongs marked O. Paste box. When filled close side oblongs for cover and tie with red or white cord or yarn.

No. 10—Twine Holder.

Material:

1 pc. light weight tag board 9"x9" (box).
1 pc. light weight tag board 3¼"x3¼" (cover).
1 ball twine.

Mark off one 9" edge of tag board 9"x9" in three 3" lengths. Repeat on opposite side. Draw lines connecting opposite marks. Repeat with two other edges. Draw two diagonals of center square. With large needle punch hole in center of center square. Cut as shown in Illus. 10. Fold on all lines but diagonals. To do



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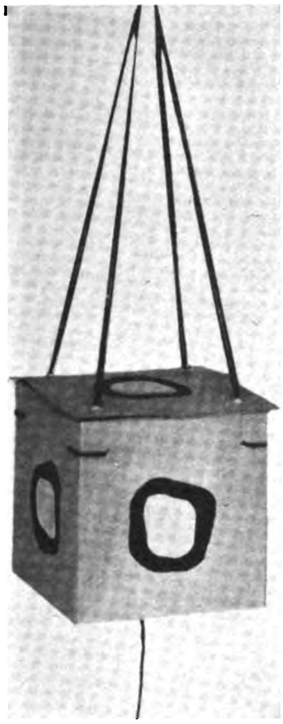


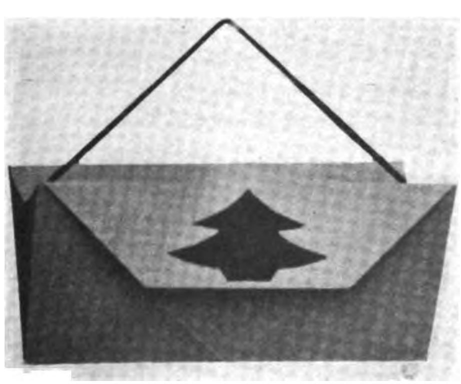
BOX, No. 10.

this place thin edge of ruler to line and fold tag board over ruler. Crease all folds again without ruler to insure good edges of box. Decorate outside of squares marked X using crayons, cut paper, or stick printing. Tag board 3¼"x3¼" may also be decorated. Cut from twine ball four pieces cord 20" long. Fold box, sides may be pasted or not as desired, punch small holes as shown in picture. Thread cord in side corners of box. Thread end of ball cord in center hole at bottom of box. Place ball in box. Thread corner cords through holes of cover, tie ends together, adjust cover.

No. 11—Basket.

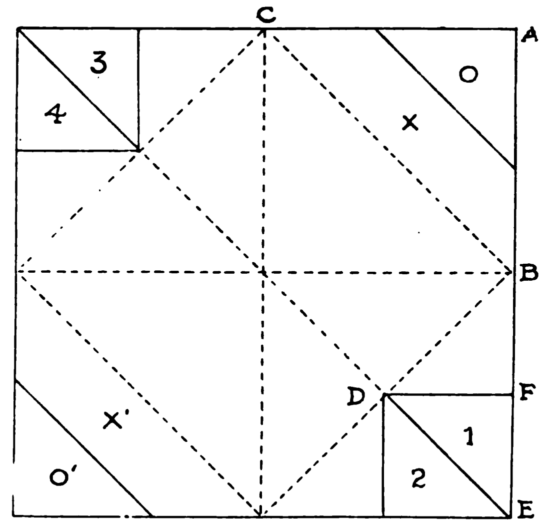
Material:

- **1 pc. green paper 9"x9".**
- **2 pcs. red paper 1¼"x2¼".**
- **1 pc. red cord 30".**



BASKET, No. 11.

Fold green paper 9"x9" as indicated in Illus. 11. Care should be used in placing point A at middle point of fold BC, also in folding opposite triangle. Cut off triangles marked O and O'. Cut fold DE. Repeat at opposite end of diagonal. Fold edge DE to fold DB, unfold, cut DF cutting off triangle 1. Repeat folding



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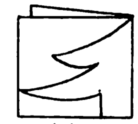


-11A-

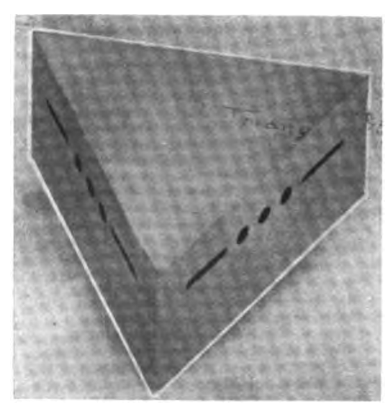
and cutting for triangles 2, 3, and 4. From red paper 1¼"x2¼" cut tree and box. Illus. 11a. Using this as pattern cut tree and box from second red paper. Paste trees on parts marked X and X'. Place end triangles one over the other with edges close to folds. Punch two holes in each end of basket. Thread in cord and tie ends. Handle of basket in double cord.

No. 12—Triangular Box.

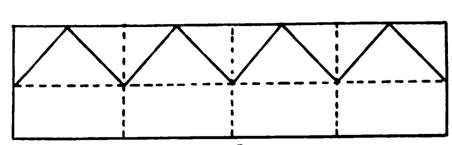
Material:

- **1 pc. light green paper 3"x12".**

Fold light green paper 3"x12" on long diameter. Unfold, fold on short diameter. Unfold, fold one 3" edge to short diameter. Unfold. Repeat with opposite

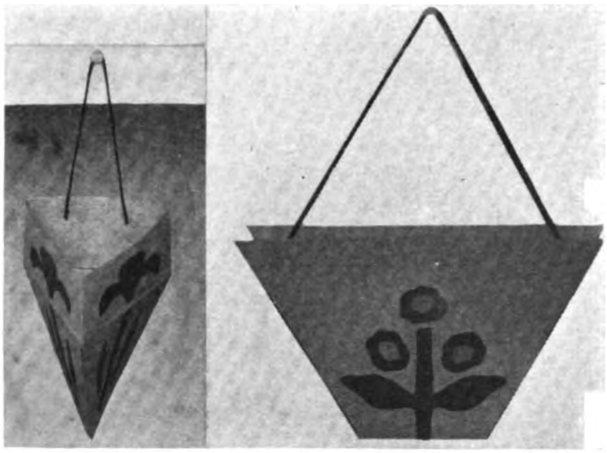


BOX, No. 12.



-12-

3" edge. Paper is now divided into eight oblongs 1½"x3". On one 12" edge mark the middle point of one 3" edge of each of four oblongs. Illus. 12. Draw lines from these points to corners on opposite side of each oblong. Cut on these lines. Decorate three oblongs 1½"x3" using crayons, cut paper or stick printing. Apply paste to undecorated oblong, fold box by lapping triangles for base and placing undecorated end oblong 1½"x3" inside decorated oblong, paste. Apply paste to point of outside triangle, paste. Repeat with triangle in box.



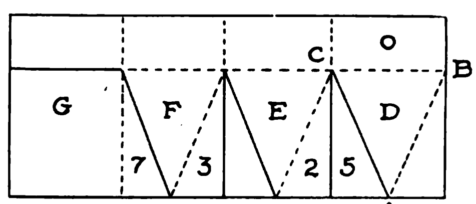
BASKETS, No. 13 and No. 14.

No. 13—Triangular Basket.

Material:

1 pc. light colored paper 5"x12".
1 pc. cord 18".

On the light colored paper 5"x12" draw line 1½" from and parallel to one 12" edge. Fold on line. Unfold paper on short diameter. Unfold, fold 5" edge to fold. Unfold. Repeat with opposite 5" edge. Paper



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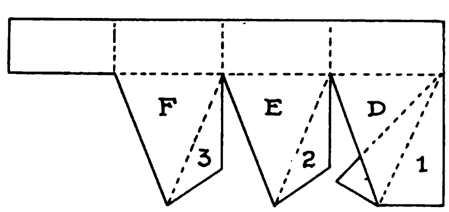


-13A-

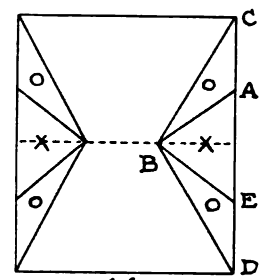
is now divided into four 1½"x3" oblongs and four 3"x3½" oblongs. On 12" edge mark middle point of edge of three 3"x3½" oblongs. Illus. 13. Place ruler to points A and B. Fold triangle 1 to edge of ruler. Crease well. Place ruler to points A and C, draw line. Cut out triangle 5. Repeat to form triangles E and F. When cutting off triangle 7 also cut off oblong B. Fold triangle 1 back on large triangle. Illus. 13a. Cut off extending part. Repeat with triangles 2 and 3. Decorate band or band and triangles with crayon, cut paper, or stick printing. Paste triangle 2 on triangle D, triangle 3 on triangle E, and triangle 1 on triangle F. Paste undecorated oblong 1½"x3" inside decorated end oblong. Punch two holes through two pasted oblongs 1½"x3". Thread in cord, tie ends.

No. 14—Flower Basket

Material:

1 pc. gray paper 6"x7".
2 pcs. green paper 2"x3" (stem and leaves).
2 pcs. dark colored paper 1"x3" (flowers).
2 pcs. light colored paper ½"x1½" (flower centers).
1 pc. cord 26".

Fold paper 6"x7" on short diameter. Unfold, mark middle of fold, place dot on fold 1" from middle mark on fold. Illus. 1. Repeat on opposite side of middle mark. Place dot on 7" edge 2" from corner. Repeat from opposite corner on 7" edge. Illus. 14. Connect points A-B-C by lines. Repeat measures and lines from opposite end of 7" edge. Repeat measures and lines on opposite 7" side. Cut out triangles marked "X". Place ruler to line, fold triangle to edge of ruler. Repeat for other three triangles. Crease folds well.



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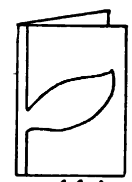

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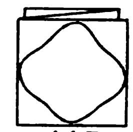


-14B-

Fold paper 2"x3" on short diameter, cut stem and leaves. Illus. 14a. Fold paper 1"x3" in three parts. Paper is now 1" square. Cut irregular circle. Illus. 14b. Fold paper ½"x1½" in three parts. Paper now ½" square. Cut irregular circle. The decorations for opposite side of basket may be traced from these freehand cuttings and cut out. Paste on basket as shown in picture. Fold basket, punch holes. Illus. 14. Thread in cord, tie ends at top.

No. 15—Baskets A-B-C.

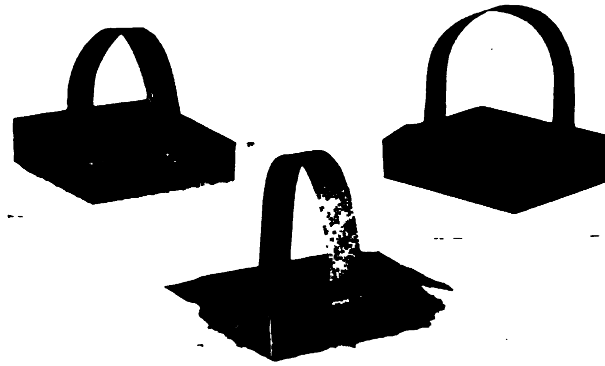
Material:

1 pc. colored paper 9"x9".
1 pc. colored paper 1"x10" or 1"x12".

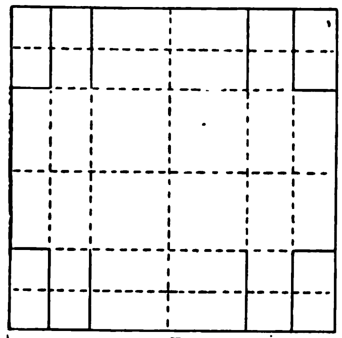
Fold and cut colored paper 9"x9" as indicated in Illus. 15. Using crayon, cut paper, or stick printing decorate oblongs 1-2-3-4. Illus. 2. Cut 1" slits. See 1 and 2. Illus. 15a. Paste oblongs X to outside of oblongs O. Slip ends of handle, 1"x10", through slits and paste to outside of oblongs.

By folding down oblongs 1-2-3-4 and applying a little paste at each end you have basket B.

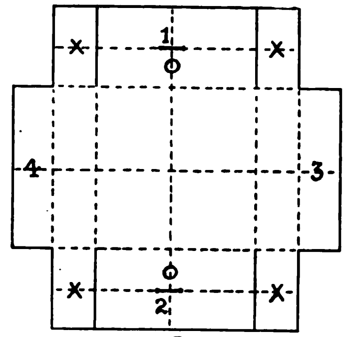
Basket C is made by cutting oblongs 1-2-3-4 as shown in Illus. 15b.



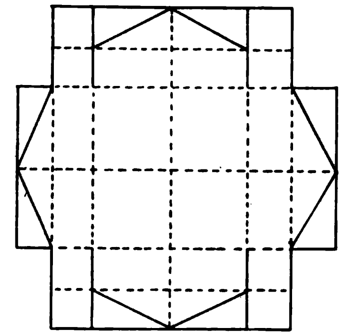
VARIATIONS OF BASKET No. 15.



~15~



~15A~



~15B~

The pictures, drawings, and directions for the four following objects will be found in my pamphlet *Pasteless Paper Construction.*

1. Plate 6, p. 24, Directions for folding unit.
2. Sachet.
3. Bird Book.
4. Double Picture Mount.
5. Single Picture Mount.

Establishing an Automotive Course

(Part One)

Everett G. Glenn, South High School, Minneapolis

MOST everyone knows that the automotive industries have had the most phenomenal growth yet recorded. In 1910 there were approximately 800,000 motor cars and during 1920 there were 8,932,458 motor vehicles registered in the United States. This means one motor car for every 11.48 persons, and represents a growth of approximately 1000 per cent in ten years. The total license fees from these cars was $98,000,000, 92 per cent of which is devoted to highway work and eight per cent to administrative work. When we consider the amount of labor it requires to build, operate, and repair these motor vehicles we wonder what would become of those so employed were it not for the automobile.

The average locomotive is composed of about 500 parts, while the modern motor car consists of approximately 3,500 parts. Before a man is given charge of a locomotive he must have spent several years, in study of it, as a hostler and as a fireman. Anyone may buy a car and after a few hours training be put in charge of it. His ignorance of that particular machine is bound to cost him excessive upkeep charges and grief.

Most automobile manufacturers find it necessary to run their own schools in spite of the fact that they may be the largest taxpayers in their cities and furnish more employment to the graduates of the public schools than any other single industry. The automobile is not confined to the large manufacturing centers but it is scattered quite evenly over the country, the south being somewhat behind the north in the number of cars per capita. The demand for training in automotive work has been so great that private schools have sprung up in almost every city. These schools charge as much as $500 for a course of study lasting a few months and they are nearly always filled with students. Besides the tuition they have the free labor of the students and operate as a garage, charging standard prices for the work turned out.

These facts seem to indicate that a course in automotive work in our public high schools would not come amiss and would be even more valuable as general knowledge and trade training than some of the work we now have.

Suppose that we have decided to install such a course in a high school enrolling between 1000 and 2000 students. We would find a demand for automotive training coming from three different sources.

First. The high school boy would demand it as part of his general training or possibly he would want it also for its immediate benefit in helping him to care for and to repair his father's car. He is hardly fitting himself for any trade but rather is getting a general education which he knows will help him along in the world, or he is preparing himself for college. In his case the work would take the form of pre-vocational training. This does not mean that he is taught anything but what is practical, since there is as much educational value in teaching practical things as there is in teaching any other.

Second. There would be a demand from car owners and prospective car owners for an evening school course which would teach them how to operate, care for, and repair their cars. Such courses are always popular and like the above should take the form of pre-vocational training. They are the regular high school courses abbreviated.

Third. There is in every city a large number of boys between the ages of 15 and 21 who have dropped out of school. The majority of these have quit because they have become tired of school and want to go to work. Distance lends color to almost everything and when they

were in school they longed to carry a dinner pail. But after getting about a year's taste of labor they have given up their jobs and are just drifting. There is plenty of equipment that can be used, while the regular student is not using it, to teach these boys the trade. They should be in school, if possible, six to eight hours per day. However, it may be that they have jobs which will allow them only four hours per day.

The demand for trade training will best be met by unit courses, such as vulcanizing, garage or auto mechanics, battery work, oxy-acetylene welding, and automotive electricity. Some say that a trade cannot be taught successfully in a school but if it is taught on a commercial basis with commercial equipment it will be a success. Trade training cannot be taught to either the high school student or the evening school student because there is not time enough nor sufficient equipment.

Pre-vocational training in automotive work consists of teaching the student the operation, care, and proper methods of repair but does not teach him skill and speed. Trade training includes skill and speed. The aim in trade training is to turn out a skillful operator, one who can go from the school to the shop and execute a properly finished piece of work in about the same time that the average tradesman requires to do it.

Unit Courses in Vulcanizing.

Six hours per day, five days per week, for ten weeks, with a two weeks' finishing course in a good shop, will make an average tradesman in vulcanizing work. The idea in giving a two weeks' finishing course in a shop is to thoroughly acquaint him with shop conditions and to remove any strangeness he may have upon entering a shop as a repair man. Any company will be glad to get his services gratis for two weeks. It is best to arrange this cooperation with quite a number of shops so that no one shop is over crowded. Upon completion of this course the student should know how to test, vulcanize, fix the price, and label tubes. He should know how to judge tires, determine the best repair to make and estimate its cost, how to make sectional repairs according to the Goodyear system, how to repair rimcuts, sandblisters, cuts in the tread, and breaks on the inside fabric. He should also know a tagging system and how to store tires, how to meet people and sell tires and tire accessories, how to lay out a vulcanizing shop and route the work, and also how to give real tire service in general.

Vulcanizing, as a trade subject, is very nearly ideal. It does not require extensive training; there will be very little material wasted; the cost of permanent equipment is small; and when the average fellow finishes the course there is a position ready for him at good wages. Besides this, it is a nice source of profit for the whole automotive department.

Cost of Permanent Equipment for Vulcanizing. Twelve Students.

1 Craft Five-cavity Vulcanizer complete with the following:
9 pairs semi-steel bead moulds, 5 clincher, 3", 3½", 4", 4½", and 5" and 4 straight side, 3½", 4", 4½", and 5".
1 24" tube plate, 5" wide.
1 3½" inside vulcanizing arm.
1 inside core clamp.
— Two rows of adjustable screw clamps to adjust bead moulds.
4 Clamps for tube plate.
1 Gas regulator.
For gas steaming........................$445.00
(For gasoline steaming add $39.00).
(Shipping weight 1,300 lbs.)

1 combination buffer and grinder...............	$ 28.50
1 3½" third circle retreader as attachment for above machine	50.00
(This equipment can be purchased from the Minneapolis Iron Store Co.)	
1 Firestone air bag 3"x18".	5.00
1 Firestone air bag 3½"x18"..................	5.50
1 Firestone air bag 4"x18".....................	6.00
1 Firestone air bag 4½"x18"....................	6.75
1 Firestone air bag 5"x18".....................	8.00
1 Success wire wheel brush....................	10.00
2 bench tire mandrels 3".......................	6.00
8 bench tire mandrels 4".......................	28.00
2 bench tire mandrels 5".......................	9.00
1 tube testing tank............................	2.00
1 tire pump of the single action type...........	2.50
4 tire spreaders	5.00
6 tube roughing brushes.......................	3.60
Individual Hand Tools.	
12 square blade knives.........................	3.60
12 fabric or step-off knives....................	6.00
12 pairs vulcanizer's shears...................	12.00
12 corrugated stitchers	12.00
12 fabric hooks, which can be made in the blacksmith shop	
Total cost of permanent equipment........	$654.45
Installation	100.00
	Total, $754.45

Supplies.

Goodyear tire repair materials as follows:
25 lbs. G-105 black tread gum.
12 lbs. G-100 white tread gum.
25 lbs. G-170 cushion and tube gum.
5 lbs. G-180 quick cure gum for tube repair.
5 lbs. G-190 combination gum for tube repair.
25 lbs. HF-41 repair fabric.
5 gals. C-16 cement.
1 gal. C-25 quick cure cement.
6 Goodyear cord patches.
— reliners, and assortment.
— Valve patches.
— Valve cores and parts.

Battery Repair.

Practically all cars are equipped with storage batteries and, as the average life of a storage battery is less than two years, there is great demand for battery repairmen.

The unit trade course in battery work should teach the student skill in all of the following: testing a battery while in the car (by means of the lights and horn, with the hydrometer, with the voltmeter and high rate discharge test), how to charge batteries and make cadmium tests, tear down a battery, judge the plates and degree of sulphation, install new separators, burn on new plates or burn on a group, assemble and seal, burn on the straps, etc. Time for this course is six hours per day, five days per week, for ten weeks, with a two weeks' finishing course in a shop.

Cost of Equipment for Battery Repair Work.

Benches	$ 40.00
1 Hyrate cell tester	15.00
1 link cutter	5.00
1 U. S. lead burning torch from U. S. Welding Co.	25.00
1 set taper terminal reamers	4.00
1 battery plate press (Ambu)	37.50
2 pairs terminal tongs	5.00
6 hydrometers	4.00
2 plate burning racks	20.00
1 cadmium lead	3.00
Plumbing and gas-fitting	100.00
(Plumbing should consist of lead sink and lead pipes to sewer capable of draining sulphuric acid. There should be two gas plates, one Bunsen burner and one gas outlet for the lead as burning torch. City gas and oxygen make the best as well as the cheapest flame for lead burning.)	
Total cost of permanent equipment for battery repair work, including installation	$258.50

Automobile Mechanic's Course.

This course prepares the student for general garage work and is popular with most boys. However, the field is quite well filled and as a trade course it has less to recommend it than has any of the other courses listed here. It cannot be beaten as a pre-vocational subject for the high school student, because it involves so much in mechanics of all kinds.

The field covered by this course is too large to list all the important jobs a student should know how to do upon completion of it but a few will be given: he should know how to clean carbon, grind valves, adjust valves for clearance, take up bearings, adjust and repair the different types of clutches, adjust the common types of carburetors and repair them, set an ignition system to an engine, wire a car, test spark plugs, find firing order of a motor, assemble a differential and install a rear axle, align front wheels, tighten a steering gear, and repair a leaky radiator.

The equipment for this course can be bought at junk prices if the purchaser knows his business. In buying this equipment from automobile wrecking concerns care must be taken that they do not "palm off" some old special equipment which is illustrative of principles now discarded. If the equipment fills the following specifications one cannot go far wrong.

1 4 or 6 cylinder motor of the L-head type equipped with a high tension magneto	$ 50.00
1 4 or 6 cylinder motor of the L-head type equipped with a starting and lighting system and battery ignition	60.00
1 6 cylinder motor of the valve-in-head type equipped with battery ignition	60.00
2 engines and chassis complete with starting and lighting systems	200.00
1 Ford engine and chassis complete with starting and lighting system as used on the late Fords	100.00
1 Ford motor of the old type, 1918 or earlier	50.00
1 Borg and Beck clutch	20.00
1 multiple disc clutch	5.00
1 zone clutch	2.00
1 standard transmission	5.00
1 rear axle assembly of the full floating type	5.00

Cylinder blocks, pistons, crankshafts, and other parts can be picked from the junk pile. By going to an authorized Ford service station the following can be got from their junk pile for almost nothing: cylinder blocks, valves, enough parts to make a transmission, and enough parts to make a differential.

Ten carburetors should be obtained for $75. (Carburetors must be modern to be of any educational value. Refer to the statistical number of the Automotive Industries Magazine or of Motor Age for a list of all the cars made in the United States with their technical specifications. Select ten to fifteen of the most popular makes of carburetors. Write direct to the manufacturers of these carburetors, using your school stationery. Tell them about your work and ask for lowest prices for one or two for educational purposes and some of their literature). They will send you much valuable literature, some will send sectioned models, and in all cases very liberal discounts will be allowed.

Tools, including Walden or Blackhawk wrenches, open-end wrenches, valve grinders, thickness gauges, breast drills and regular twist drills of the smaller sizes, pliers, screwdrivers, hack saws, files, vises, etc., $100.00.

Each student who takes the course should be required to have an 8" or 10" Crescent adjustable end wrench, a good pair of combination pliers, and a 6", 8", or 10", screwdriver.

The engines should be mounted so that they can be run. Individual gas tanks, exhaust pipes, and batteries are desirable. The exhaust gases present the greatest difficulty in installation. They must be piped to a proper outlet with little chance for escape, as with student operation of an engine there is danger of carbon monoxide gas poisoning. The exhaust pipe of the engine should be fastened with pipe fittings and a foot of flexible tubing to the pipe which conducts the exhaust outdoors. A 6" to 10" pipe laid in the concrete of the floor and having an exhaust fan at its opening makes a good device for getting rid of the exhaust gases. A drain should be placed under the engines and also water outlets for cooling. These outlets should be equipped with fawcets having hose connections.

Cost of installation as here outlined	$ 150.00
Entire cost of equipment installed	882.00
If actual car repair is contemplated add	1000.00

The automobile mechanics course does not lend itself so readily to commercial work as do the other unit courses herewith outlined. Before a student is allowed to touch a car he should be entirely familiar with all of the equipment herewith listed. He should have had his lectures and laboratory course completed, then, if there is the time, room, equipment, and cars to work on he may be allowed to work on them with very careful, individual supervision.

Many schools have tried installing an automotive course by putting "green" students to work on cars There is very little educational value in this, because the jobs are so vastly different that it is hard to organize the work and the result is a wrecked car with its owner an enemy instead of a friend, a disinterested stu-

dent, and a worried instructor. Much better is it to have equipment as above listed and, by means of a laboratory course consisting of various operations common to the repair of a car, teach him in a systematic manner how to make repairs. In this way his mistakes are not costly and his education is better.

Unit Course in Automotive Electricity.

Certainly a pre-requisite for this course should be a high school course in physics which includes elementary electricity. The high school student who has completed a course in physics should not be put into the same class in automotive electricity with those who have not had such a course. This course has proven itself quite popular and of good educational value to the high school senior who is taking or has had his physics. Many of these are especially interested in electricity and to them this is valuable work.

Some technical high schools which have both electrical and automotive departments have this work taught in the electrical department by the regular electrical instructors. In as much as automotive electricity is a very special branch of electricity and furthermore that it cannot be separated from the gas engine work it seems to the writer that it certainly should be taught only in the automotive department. I have talked with many good electricians and have yet to find one who will admit that he knows much about the electrical equipment of an automobile. There is little similarity between wiring a house or switchboard and wiring a car or locating trouble in its electrical system. Another objection to separating the work is that there is great danger of friction between the two departments.

This course, when taught as a trade course to high school graduates, can be taught in six hours per day, five days per week, for twelve weeks. If it is taught to those who have not had physics one should add four or five weeks to this time for a course in elementary electricity.

In this course about half the time should be spent in the lecture room and the other half in a well-equipped laboratory. Upon completion of this course the student should be able to locate all kinds of ignition, starting, and lighting troubles. He should be able to wire up any car, without the use of a diagram so that it will operate satisfactorily. He should also be taught how to wire a car according to a diagram. He must know and be familiar with all of the most popular makes and models of ignition, starting, and lighting units and how to repair them; how to test an armature, field coils, ignition coils and condensers; and how to overhaul a high tension magneto and set it to an engine. He should know the methods of current regulation in the common types of generators and how to rewind field coils. Rewinding armatures is quite difficult and is not ncessary for him to know as it is more or less a special branch. There are, of course, many other things he should know but these are some of the most important ones.

(To be continued)

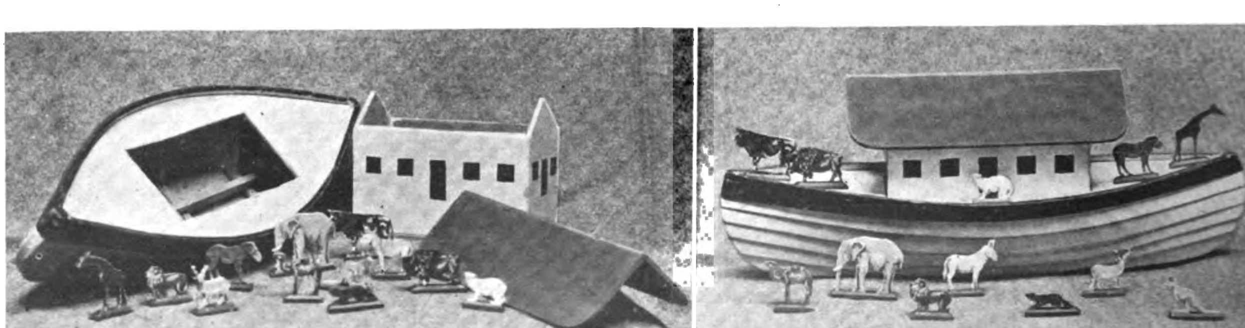
Noah's Ark and Animals

E. W. Tuttle, Director Practical Arts Department, E. Orange, N. J.

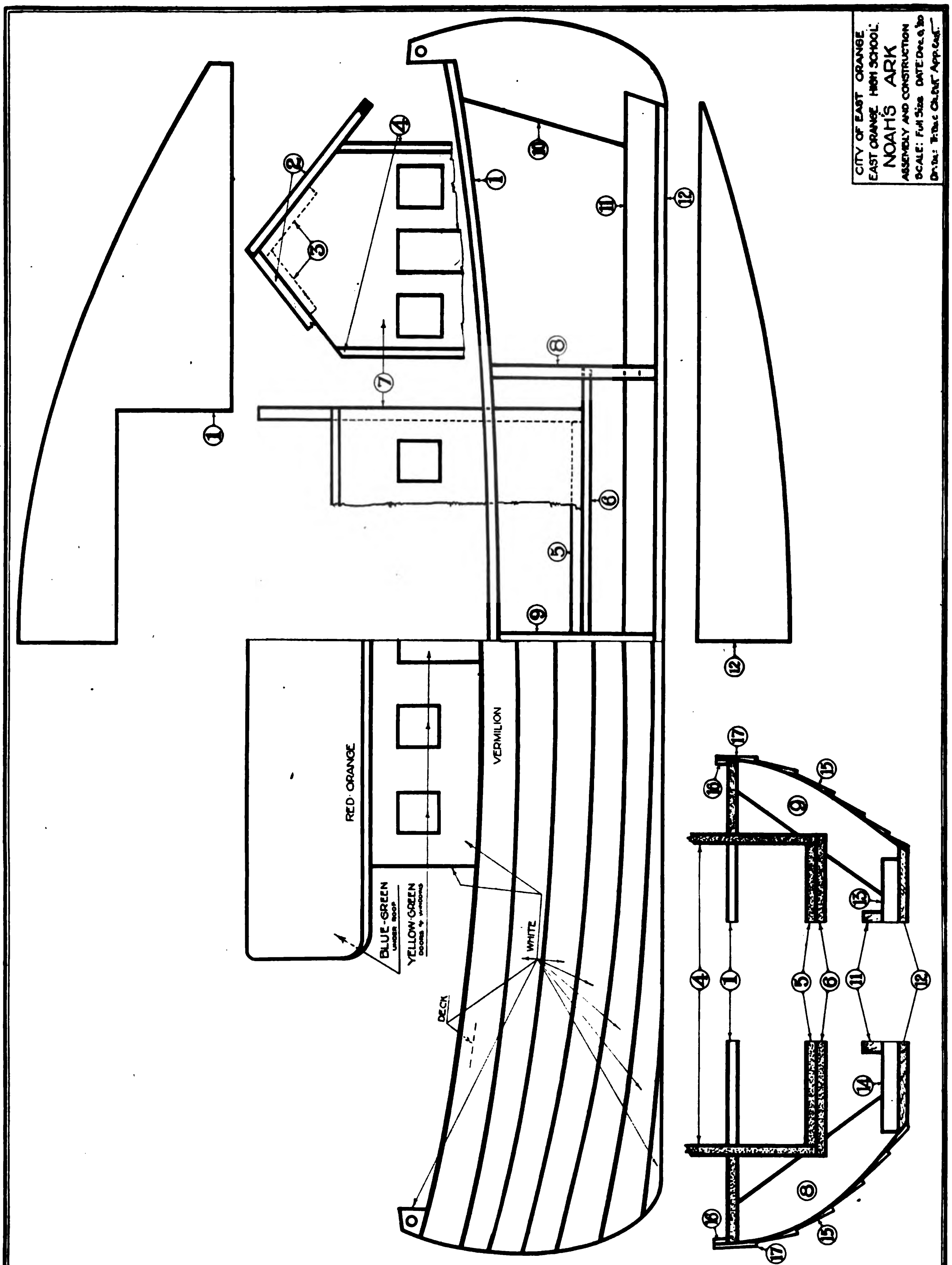
THE three prime factors that govern the choice of practical arts projects are generally accepted as being motivation, education, and economy. Economy, for the past three years, has been the watchword; but our energies and ambitions have by no means been restrained thereby.

The Noah's ark and animals problem offers an eighth grade project that well covers the three prime factors, especially the last, economy. The actual cost of the necessary supplies for this project barely reaches the dollar mark, while its market value exceeds the cost many times.

Little needs to be said of the animals, with the exception of reference to the material, which must be either three-ply basswood or its equivalent. Devoe show card colors are very convenient to handle and dry quickly. The drying quality is quite important on account of the necessity of storing the toys at the end of class periods. Tag board or tin templets have proven most successful. They help to bridge unnecessary difficulties and preserve interest, while increasing efficiency in production.

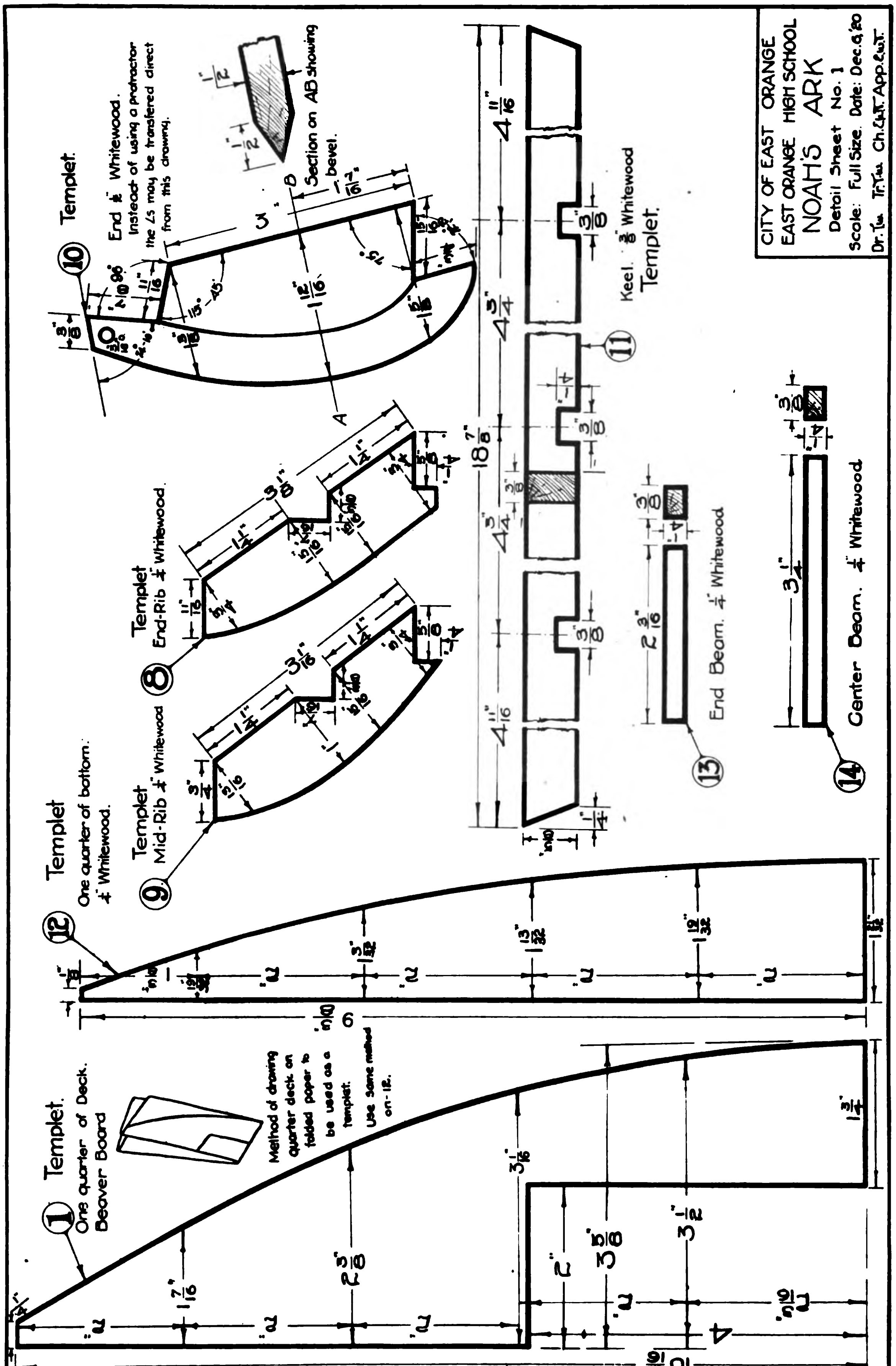


THE ARK READY FOR PLAY.



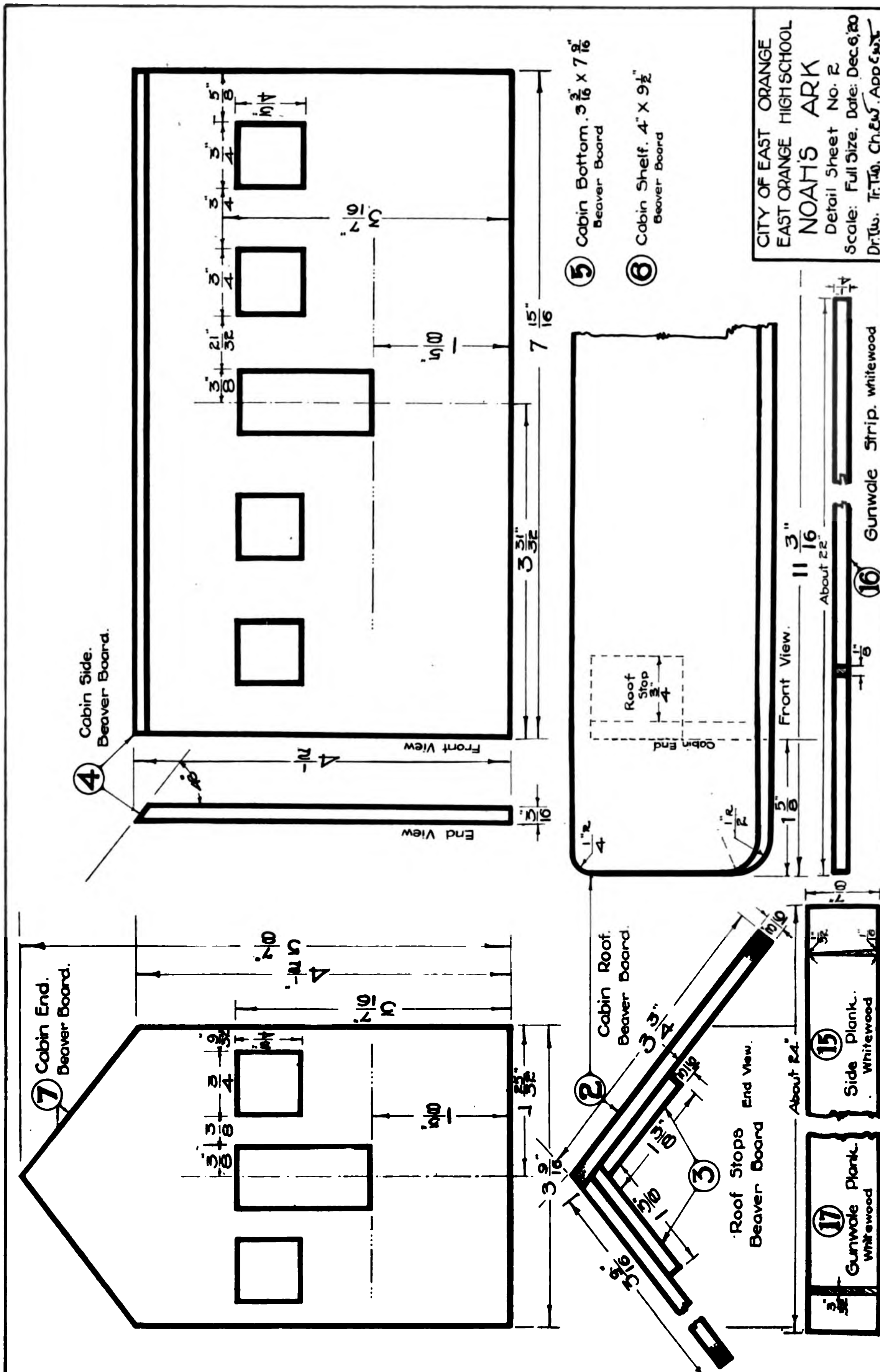
The sizes of the animals are not accurate when considered upon the basis of life comparisons. Convenience rather than mathematical nicety has here been sought. Sizes can be worked out to suit individual cases. The proportions given on detail sheet No. 3, while simply suggestive, have been worked out to a successful application.

The ark differs greatly from its historic original but seems to answer the purpose, in addition to offering

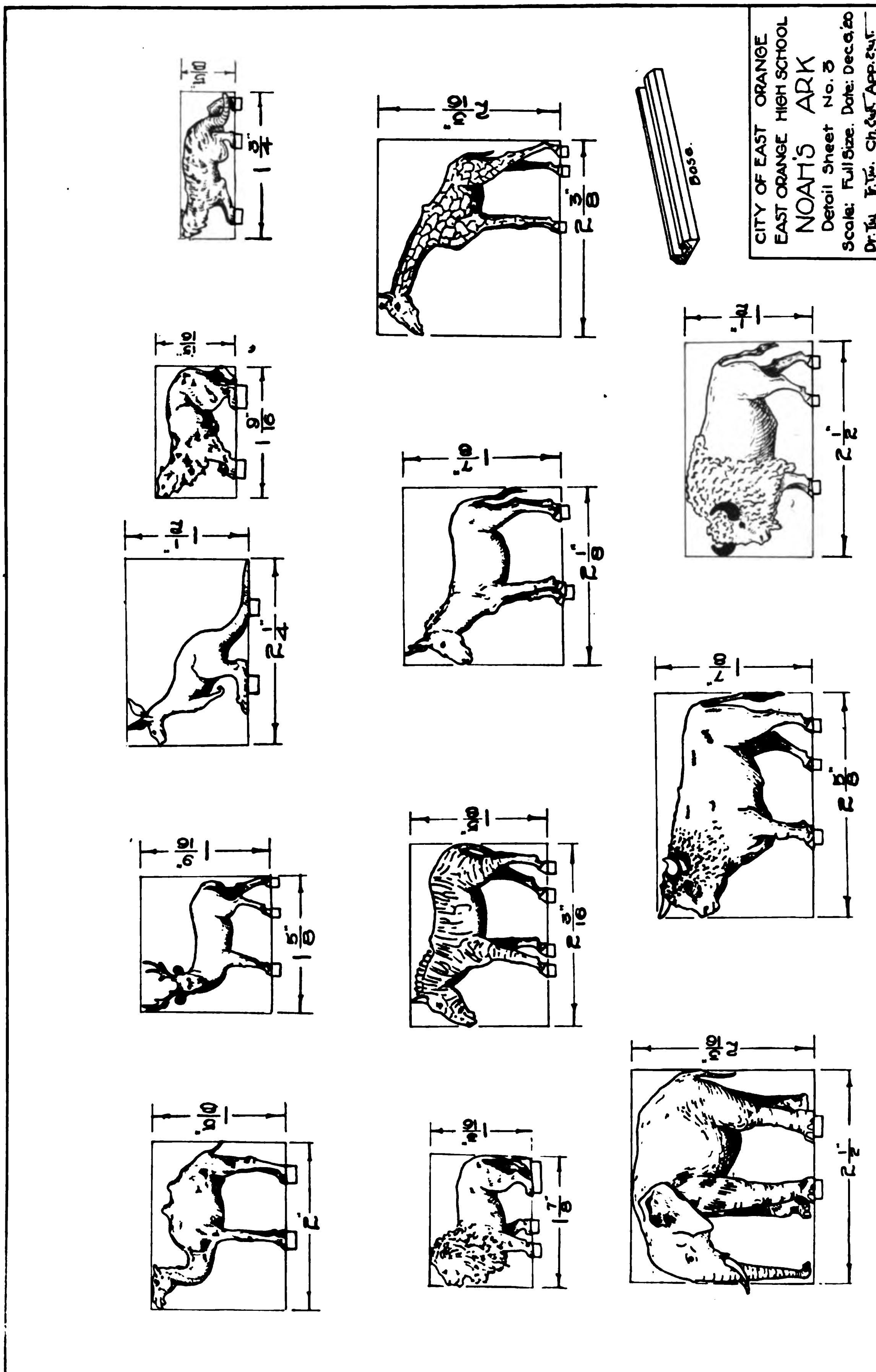


splendid opportunities for experiment in amateur boat building.

In assembling the hull, it is well to use the following directions: When the keel has been laid, nail together the parts as follows: (a) Center beams, end beams, and ends; (b) Mid and end ribs; (c) Cabin shelf; (d) Deck; (e) Tack gunwhale plank lightly to mid rib, start laying the side planks working from the



top down; (f) Tack the side planks lightly to mid rib, leaving about 5/8" to the weather; (g) Tack the gunwale plank lightly to both ends; (h) Slip the thin edge of side plank under gunwale plank and tack lightly. The planks are cut long enough to extend over the ends about 1". When finished, the ends are trimmed off and



sanded to good surfaces with the end beams. F. H. wire nails ½" No. 18, ¾" No. 19, and 1" No. 20 are the necessary fastenings.

The hull, when finished, must be calked with white lead in order to fill any cracks in the planking. This will make it watertight and usable as a boat.

The cabin must be made accurate to dimensions in order that it may be easily removed from the hole in the deck. This makes a two-fold project. The cabin may be used as a house for the animals, and the hull, for a boat.

Two coats of paint and one coat of spar varnish will finish the hull to reasonable satisfaction.

The cabin and animals may be finished with flat paint and shellaced, or they may be painted with a good quality of enamel.

The windows and doors on the cabin are marked out with a stencil and finished freehand with the small brush used in painting the animals.

The sawing out of the planking is a machine process and, unless access to a power saw is possible, the project should not be attempted. In other respects, the construction is suitable for any elementary shop.

Topics for study and class discussion:

Geography, history, nature study, and commercial values of the various animals.

Manufacture, general uses, and cost of Beaver Board.

Review "from stump to market" of white wood, its identification, general uses, and cost per board foot.

Geography, history, and manufacture of the wire nails.

History, chemistry, and manufacture of paints, varnishes, and shellacs.

Study and discuss the educational value of templets, jigs, and fixtures.

Safety First--Common Sense a Poor Second

Eward H. Crussell

THE following list of rules was culled some time ago from the pages of a well known magazine:

1. Never use a machine until you have secured permission from the instructor.
2. Never use a machine until you are conversant with the safety rules governing the operation of that machine.
3. If anything goes wrong, throw off the power immediately and report to the instructor.
4. Never leave a machine with the adjustments loose.
5. Do not talk to anyone working at a machine.
6. Never attempt to oil, repair, or set up a machine while it is running.
7. Never allow debris to accumulate around a machine.
8. Always use the guards.
9. Never wear a four-in-hand necktie and allow it to hang loose while working around a machine. Wear close fitting clothes. Be sure that the sleeves of your jacket are tightly buttoned or turned up at the elbows.
10. Never play pranks or scuffle with a fellow workman.
11. Never use a machine while the instructor is out of the room.
12. Never use a tool with burred edges.
13. Never wear jewelry on the hands while operating a machine or working with hot metal.
14. Never attempt to look about you while operating a machine. Attend strictly to business.
15. Never throw off a belt with your hand, use a stick.
16. Never use a file without a handle.
17. Never use the emery wheel without wearing goggles.
18. Never try to stop an emery wheel with your hand.
19. Never try to talk and work on a power machine at the same time. It is impossible to do two things at once and do them well.
20. Never throw a switch lever in or out too slowly.
21. Cultivate personal caution."

The magazine gave credit to the author of the rules and appended the following note: "These rules should be printed and distributed to every pupil in an industrial class where machinery is used and a large placard containing the rules should be hung in every such shop."

For reasons which will shortly appear, the present writer refrains from mentioning either the name of the magazine, or the name of the author of the rules. They are no better and not much worse than a lot of the same sort of piffle that has preceded them, and are used in this article as a "horrible example", to emphasize some of the more common mistakes made by those interested in the safety first movement and the propaganda pertaining to it.

We often find criticism classed under two heads, namely: destructive and constructive. This classification the present writer has always refused to recognize. Criticism, according to his understanding, is either true or false; true criticism is more often destructive than otherwise; destructive of things which are wrong, in order that things which are right may take their place. Things which are right cannot be hurt by criticism, false or otherwise. With this explanation, let us admit that this article is choke full of destructive criticism.

Superfluous Rules.

Let us first consider the note which was appended by the magazine. I wish to go upon record as saying that of all the fool ways of wasting time, money and materials, printing rules and distributing them to pupils is at the head of the list.

Perhaps you do not agree with me. Moreover, you may think the rules are very good, and you may agree with the editor who said they should be printed and distributed to pupils. Fine! Let us now reason together. You have just read the rules, how many of them can you repeat from memory? Four? Five? All of them? If you can, it is because you already knew them before you met them in this list. The rules in this list, which you had not met with or thought of before, would surely be the ones to which you would pay the most attention, and yet I think I am safe in saying that of these rules, if there were any, (and I sincerely hope there were) you do not remember one. And if you, with your

more particular interest in them do not remember them, why should you expect the pupil to remember them?

You say that you expect the pupil to read them more than once—to learn them by heart? Well let me say, when the time comes that pupils do all that they are expected to do, and are able to get their knowledge from printed instruction sheets, your job will be gone and so will mine, and teaching instead of being one of the most difficult of the arts will be as easy as feeding chickens. But until that time comes, a list of safety instructions in the pocket of the pupil at the lathe or circular saw, will be of no more use to him than a book on the art of self-defense would be to me were I so foolish as to get into an eighteen foot ring with the champion prize-fighter of the world.

In my experience in safety work, I have found only one thing equally stupid with distributing printed lists of instructions to the pupils, and that thing is: printing rules on a large placard and hanging them up in the shop. The only pupil, or we might better say the only person who will pay any attention to these posted rules, is the one who would observe the rules whether they were posted or not.

So much for the negative value of these posted rules and warnings, we come now, to what close observation has convinced me is a very positive evil in connection with them, and that is: Too many instructors stick to these warnings around their machines, and distribute them to their pupils in an endeavor to dodge their own just responsibilities. They seem to figure that once the warnings have been posted and distributed, they have done all that they can be expected to do for the prevention of accident, and if the pupil should now meet with a mishap it is entirely his own fault and he has nobody but himself to blame because he did not follow the rules. Instructors in the schools are not the only ones at fault in this matter either, those in the business world and in the industries are every bit as bad and, in many cases. much worse.

Proper Teaching vs. Printed Warnings.

I respectfully suggest that those of you who have been putting your trust in printed rules and warnings, pause right here long enough to let this indisputable fact sink in: *If the learner is properly taught, he has no need of printed warnings; if he is not properly taught, printed warnings are of no use to him.* And now, if you still believe in signs, get that printed in large type and paste it on the face of the classroom clock.

So much for the magazine's endorsement, let us now briefly examine the rules, taking them in numerical order:

Rule 1. This is a senseless and useless rule. If the instructor is doing his duty, pupils will no more think of using a machine without his permission, than they would think of helping themselves to the contents of his purse.

Rule 2. Thoroughly covered by rule 1.

Rule 3. This must be taught as a habit, not written out as a rule.

Rules 4, 5, 6, 7. Same as rule 3.

Rule 8. Grand! Took a smart brain to think of a rule like that; unfortunately, the guards cannot always be used.

Rule 9. Ask any boy's mother if you can teach him to keep his clothes in order by writing rules about it.

Rule 10. See rule 5.

Rule 11. See rule one.

Rule 12. A close observance of this rule would entirely do away with the use of the cabinet scraper. Wouldn't it?

Rule 13. Takes in too much territory. One cannot mix the safety precautions necessary for the operation of machinery with those necessary for the handling of hot metal and get good results.

Rule 14. See rules 10 and 5.

Rules 15. See rule 2.

Rule 16. O----h Hum! Didn't use a hammer without a handle either.

Rules 17 and 18. See rule 2.

Rule 19. See rules 5, 10, and 14.

Rules 20 and 21. Good advice, and worth just as much for safety precaution purposes as good advice usually is.

And now, having with our destructive criticism, cleared some of the debris out of the way, let us see if we can offer anything to put in its place.

Constructive Criticism.

Some few accidents are unavoidable, they occasionally happen to the most careful of workmen; the majority of accidents are, however, due to carelessness and lack of knowledge. The actual *teaching* of safety precautions in American Industry, is something which in the past has been almost entirely lacking. Of over one hundred mechanics (woodworkers, electricians, machinists, etc., in the writer's "Teacher training classes") who were asked the question: "What safety precautions in the handling of machinery were you taught as an apprentice?" only one, a patternmaker, had been told, shown, or taught, anything of the kind. This man, *after he had finished* beveling some material on a variety saw, had been told by another workman that it would have been safer to work with the ripping guide on the down-hill side of the saw.

The other students invariably stated that the only safety precautions they received were, "Keep away from the machine altogether", and that in order to learn how to use the machine, they had to steal their chances and work at it when no one in authority was around. I feel sure that, "Keep away from the machine altogether" phrase will awaken memories in the minds of everyone of my readers who spent his apprenticeship amongst machinery.

You get the idea of course; no one wished to take the responsibility of teaching the learner how to handle

the machine, so he was told to keep away from it, with the certain knowledge that he would seize every opportunity of using it, and thus learn its ways without anyone being held responsible. If an accident happened there was, of course, no one but himself to blame, because he had received strict instructions not to touch the machinery.

It is from something of a similar nature to the foregoing, that the need for such rules as number (1) and (2), arises in the classroom. If a pupil definitely understands that somewhere in the near future he will get his proper turn at the machine, under competent instruction, he is usually perfectly willing to await that time. If, on the other hand, his queries are continually met with evasive replies, and he sees no chance of ever gaining permission to use the machine; then he will take the first opportunity to use it without permission, and the most wonderful set of rules that were ever printed will not prevent him doing so. Anyone, who has himself been a boy, will understand the pupil's attitude in this matter, and no instructor should be permitted, through ignorance, laziness, indifference, or any other cause, to delegate his just responsibilities to a set of printed rules.

A Reduction of Accidents.

In the past, statistics have been brought forward to prove that this safety first propaganda, printed rules, signs, etc., have materially reduced industrial accidents over a given period. The answer to this is, that it is not the printed rules, but the actual safety appliances put into operation that have reduced the number of accidents. A reduction of accidents in the structural steel industry is due more to the spreading of safety nets than to the spreading of propaganda; and the elimination of square cutter heads, projecting set-screws, unguarded gears, open elevator shafts, etc., is a much more effective safety precaution than the printing of scarehead rules telling the workman to keep away from these dangers.

The difference between the two can be illustrated by means of the following anecdote. In the Winter of 1898, the writer, in company with a number of other unfortunates, was helping to re-build the Victoria bridge over the St. Lawrence river at Montreal. The job was a big one and accidents were plentiful. Men in row boats were stationed in the river beneath the bridge, whose business it was to pick up any of those who were so careless as to fall off.

This worked well enough for a time, but as the Winter went on, the ice began to float down from the lakes above and the foreman in charge met us one morning with a brand new safety rule. Properly expurgated for publication it ran something like this: "I just want to tell you fellows, that anybody who falls off the bridge today will lose his job; there's too much ice in the river for us to keep a boat down there". Of course he was right, too; anybody falling sixty feet and landing on a chunk of ice eight or ten inches thick would be likely to lose his job, but at the present day our friend the foreman, in addition to his safety rules would in all probability be required to sling a safety net beneath his workmen.

No sir. Safety precautions cannot be taught to the beginner by printing rules, neither can they be taught to, from five to five hundred workmen, young or old, by gathering them together into a room and forcing them to listen to a lecture on the subject. Nor is it possible to devise a set of general rules and instructions that will apply to all machines. Nor should the learner get his safety precautions one day (either as an individual or in a class or group) and do his work on the machine the day following. And most emphatically of all, under no condition should the learner be permitted to use the machine first and get the safety instruction pertaining to that machine afterward.

Safety Precautions Must Be Taught.

Each machine requires its own set of precautions. They should be taught by an instructor who is thoroughly conversant with the operation of that machine and the safety precautions needed in its use. No attempt should be made to teach all of the precautions needed for the operation of any machine in one lesson. The instructor should first analyze the work of the machine, and make a list of the operations that may be performed on it. He should then list all the precautions needed for any particular operation and teach them to the learner along with the operation the first time he is called to perform that particular operation on the machine. Not before, and not after, but at the time when he will see a need for it and can put it into practice. Make the safety precaution a part of the operation and teach it so thoroughly that it becomes a habit. Teach one operation at a time, and prove by a thorough test, that the learner has it correctly learned before proceeding to the next.

It is here assumed that the instructor has had charge of the learner from the beginning; in which case there is never any real difficulty in teaching safety precautions, the learner cheerfully accepting them as something inevitable. If, however the learner has previously done work on the machine, and without the safety precautions, then the proper teaching of them becomes almost an impossibility. Even though the learner tries to follow the new instructions, habit becomes too strong for him and he uses the risky method without meaning to do so.

In conclusion, it may be well to state, that it does no good for the instructor to teach safety precautions unless he practices what he teaches. The young of the human race learn a great deal by imitation, and if the instructor, instead of using a push stick, reaches over the circular saw to draw through the short stick he is ripping; or throws a belt off or on with his bare hands, there will be plenty of pupils anxious to show him that they are just as smart in this respect as he is.

So much for the present, I hope, with the Editor's permission, to go further into this matter of safety work with you in the near future.

FIG. 1. GENERAL VIEW OF THE APPARATUS.

Home-Made Playground Apparatus

Supt. R. W. Wagner, Webb, Ia.

SOME-MADE playground apparatus had been accepted as the right idea, and the manual training classes had made swings and teeter-totters. "What next?" Slides seemed to be the logical answer. A fruitless search was made for drawings or blueprints. There was nothing left to do but make designs. This was done. During the weeks of construction, that haunting question persisted: "Will they work when they are finished?" But since they have been erected and tried out, and have "worked," the project is described for the benefit of other believers in the home-made-playground-apparatus idea.

About the first problem to be solved was the selection of suitable material for the bottom of the slides. Wood was not considered on account of the trouble which was feared in getting suitable stock. Metal was decided on and finally galvanized iron was the one metal selected. It was easily obtained and was not excessively expensive. It is making good in actual use.

The mounting of the slides was partly provided for to begin with. The uprights of a large pair of swings (shown in Fig. 1), served as a beginning of the supporting structure. The general plan was to have two platforms, a high one and a lower one, the high one connected with a single long slide, and the low one connected with two short slides, or with one slide and a

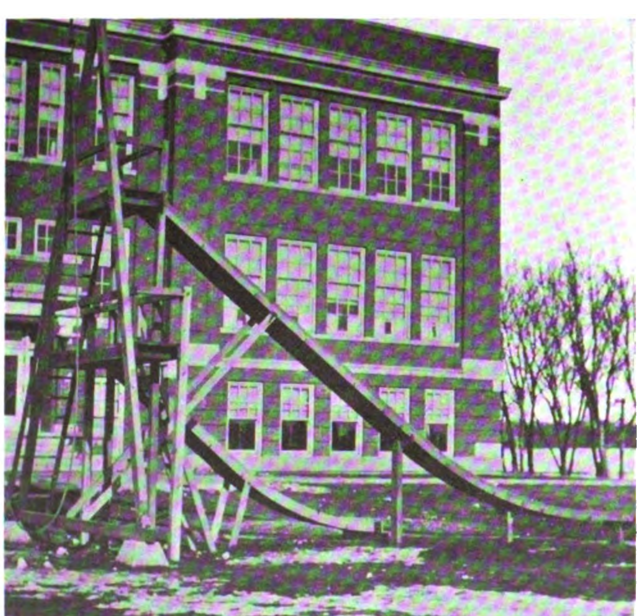
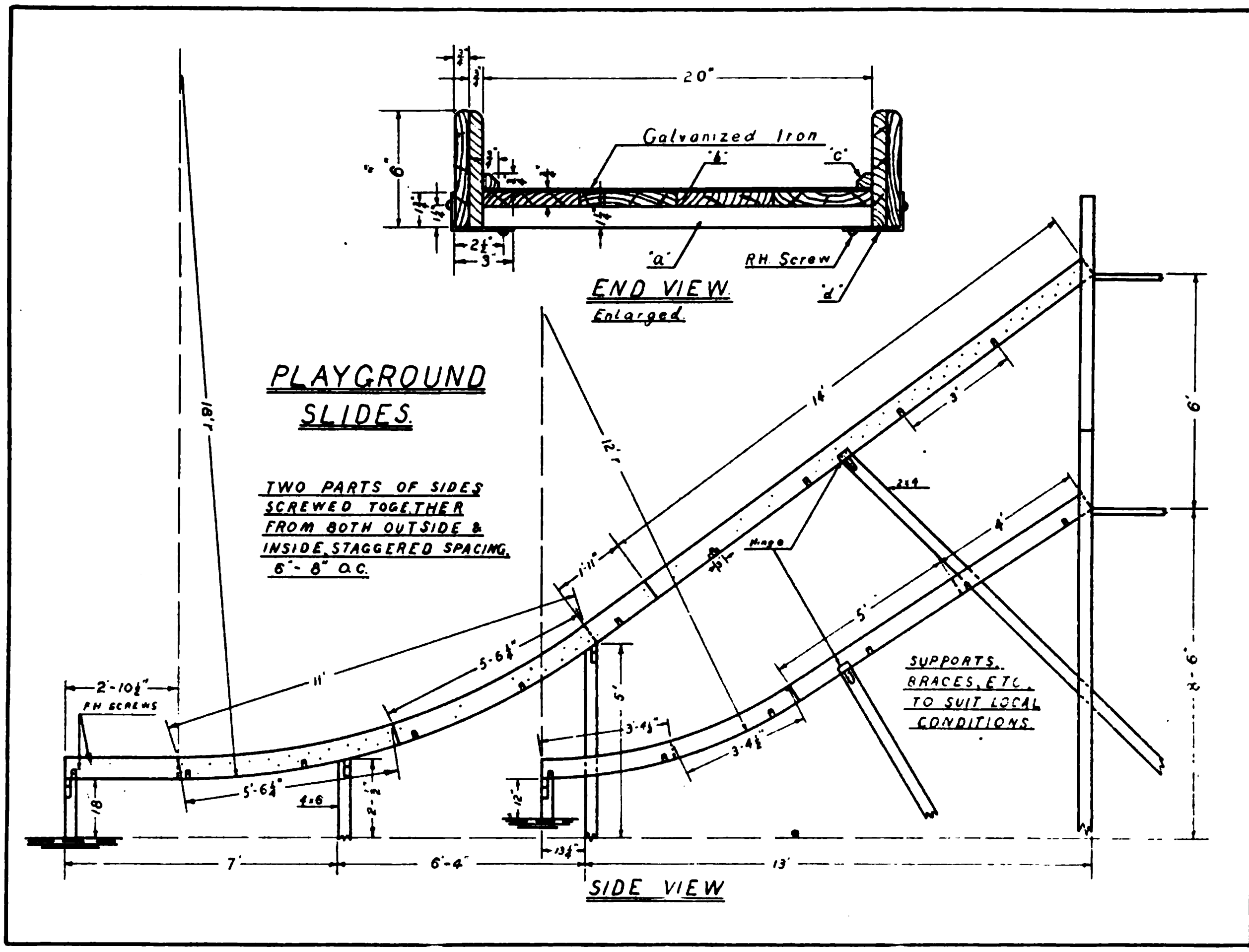


FIG. 2. THE SLIDES.

FIG. 3. DETAILS OF THE SLIDES.



DETAILS OF PLAYGROUND SLIDES.

pair of parallel sliding rods. To date, only one of the shorter units has been installed.

On one side, the platforms were supported by the two swing uprights as shown in Fig. 2. On the opposite side they were supported by four 4x4 posts. These posts were bolted to the platforms, their lower ends resting upon cement slabs buried in the ground. The two middle posts attached to both upper and lower platforms; the two outside ones to the lower platform only. These posts extended above the platforms sufficiently to serve as supports for hand railing.

The high platform is reached by a ladder to one side of the platforms as shown in Fig. 1. The ladder leading to the lower platform meets it at the middle. In this way the traffic toward the two ladders, in no way interferes. The long slide is directly above the ladder leading to the lower platform.

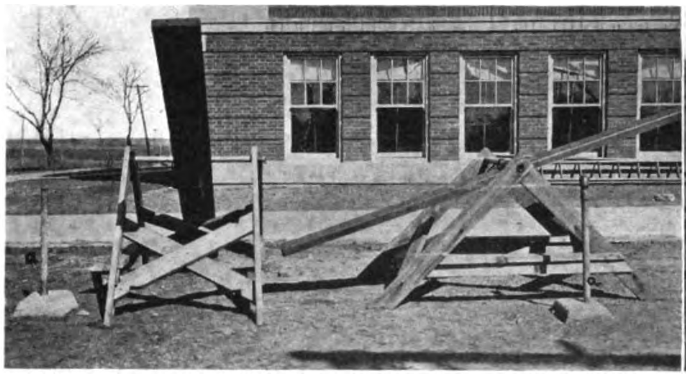
The slides proper, were constructed as shown in the drawing. The curved sections of the sides were first cut out. The first piece cut for each slide, served as a pattern for the other curved sections resulting in a saving of lumber. The parts composing each side were then screwed together, the screws being inserted from both sides and staggered. One side piece, assembled, was laid on the floor and the other side held in place above it, while the cross-pieces "a" were located and nailed in place. The assembly thus formed was then turned over and the remaining side piece, assembled, was nailed in place. The bottom strips "b" were then screwed in place. The galvanized iron was laid on over these and secured in place by the strips "c". It is necessary that the iron be secured by nails extending through "c" into the bottom boards.

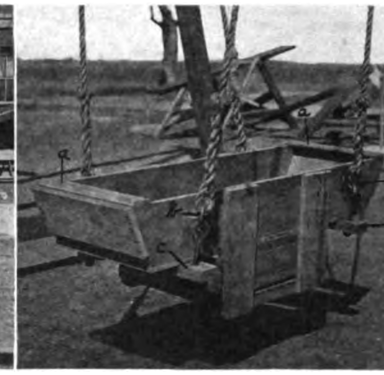
In the large slide, the bottom boards were of ¾" stock. In the small slide, these were of ⅝" ceiling. The latter material is to be recommended as superior to the ¾" stock.

The angle irons shown at "d" were made in the local blacksmith shop from wagon box iron.

The galvanized iron was obtained in standard 8" lengths; four being used for the large slide, and two

FIG. 4. CONSTRUCTION OF THE SLIDES.





FIGS. 5 AND 6. THE TEETER-TOTTERS AND THE SWINGING CARRIAGE.

for the small one. The end of each piece overlapped the piece below it like shingles on a roof. The ends were left without any fastening.

The slides are attached to their platforms by pieces of flat iron 5/16"x1½" bent to the proper angle, screwed up against the sides of the slides, and down upon the top of the platforms. The long slide is supported by two 2x4 braces shown in Fig. 3 at "a". These braces are bolted at their lower ends and attached at their upper ends by means of hinges as shown in Fig. 3 above "a". The smaller ladder fits inside these two braces, the two units thus rendering mutual support. The three 4x6 posts shown in Fig. 2 "a" support the lower end of the large slide. They stand in cement and extend 3" below the surface. At the top of each post is a 2x6 cross piece supporting the sides of the slide and attached to them by strap iron. The small slide has but two short braces as shown in Figs. 2 and 3. Its lower end rests on a piece of 4x6. See Fig. 1.

The drawing gives the slope of the slide as installed. By tilting the slide, builders may increase or decrease the slope to give greater or less speed as desired. Careful observation of the slide in use, leads the writer to recommend the indicated slope as about ideal.

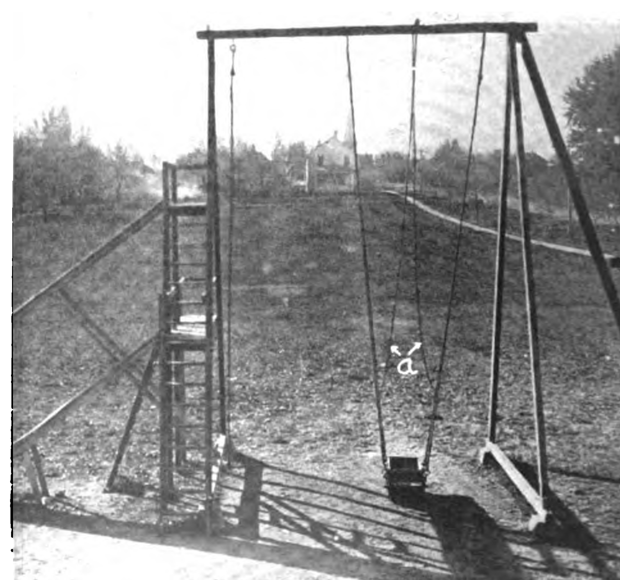
A word should be said in regard to the teeters mentioned in the first paragraph. The posts at "a" Fig. 5, stand as monuments to the failure of our first attempt. One fact that makes this failure more significant, is that prepared blueprints were used and carefully followed. Is it possible that some blueprints are made and placed on the market without being tried out?

The first time the teeters were overloaded (and they always are) they collapsed. As a result, the supports shown in the figure were designed. They are not beautiful but they have defied many an overload and are giving good service.

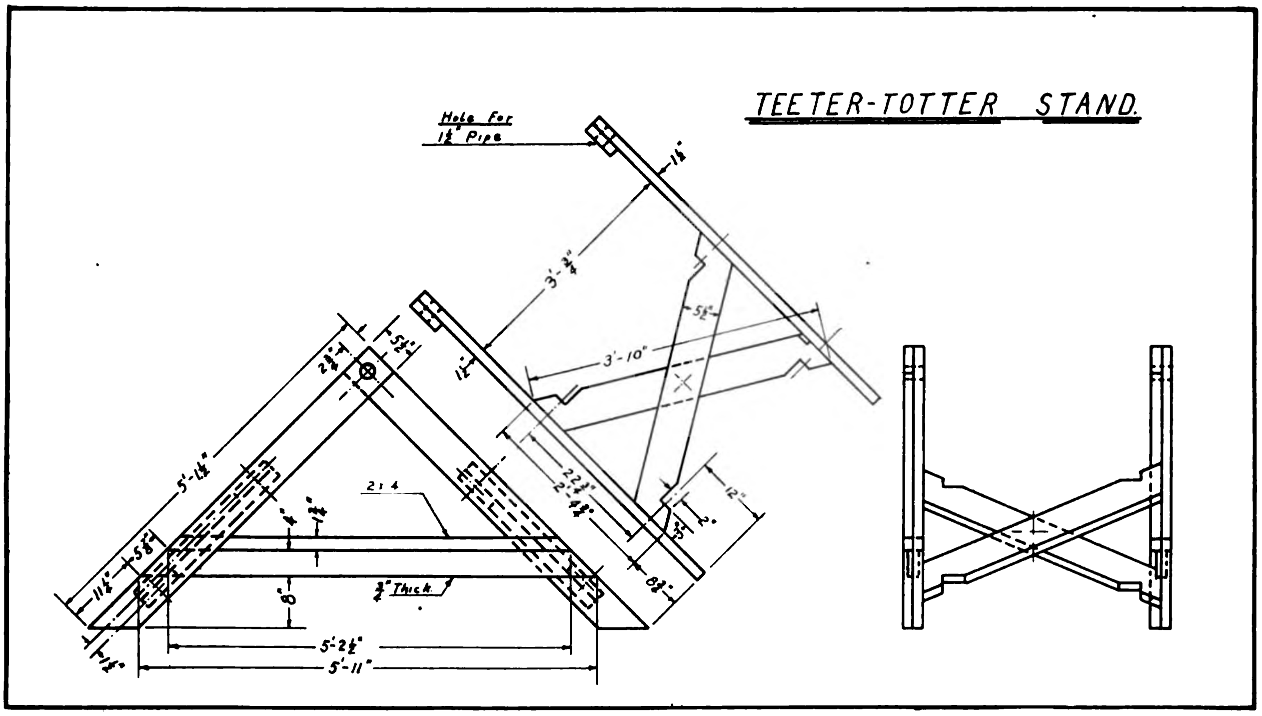
Two large swings have been mentioned in previous paragraphs. They may be seen in Figs. 1 and 2. Actual trial showed that these swings were too high (22") to be practical. Too much time and energy were required to "pump up". As a result, it was decided that some remodeling must be done that would cause these swings to pay dividends. Fig. 6 shows how the problem was solved. A carriage was built similar to that of a lawn swing. This was suspended by the four ropes of the two large swings. A change had to be made, of course, in the method of attaching the ropes at the top. Two of the ropes are taken from their own rings and spliced into the two rings containing the remaining two ropes.

The method of propelling this swing is rather unusual and its evolution very interesting. It was originally intended that the swing would be propelled by pulling on the ropes shown at "a" Fig. 6. This method proved unsatisfactory on account of the height of the swing. So it was for the inventive genius of youth to devise a successful method of propulsion. Very soon after installing, the boys began standing on the backs of the seats and "pumping" in order to get up desired speed. Consequently the strips "a" Fig. 6 were added for foot rests. Two boys stand on these and "pump", while the two passengers pull on the ropes. These are attached to a 2x4 cross-piece shown at "b" Fig. 6.

Our experience with this playground apparatus leads us to say that one important consideration in building swings is the bearings. At first eyebolts and



THE SWINGING CARRIAGE.



DETAILS OF TEETER-TOTTER STAND.

hooks were used, made from mild steel from the blacksmith shop. One day two boys were "pumping up" in one of the small swings shown in Fig. 1. Suddenly something gave way and a spill resulted. Upon examination it was found one hook had been cut through and had let the swing down. Other hooks were found just ready to give way. They were all taken down and an interview with the blacksmith resulted.

As a result, all swings constructed since, have had for a bearing a ring and eyebolt. These parts are case hardened. After being put in place, plenty of grease is used. Success has rewarded our efforts and even the ring and eyebolt shown at "c" Fig. 6 is standing up well under the enormous strain it is frequently called upon to carry. So if steel of ample size is used; if a ring is used instead of a hook; if all wearing parts are case hardened; and if plenty of lubrication is used; we feel that good swing bearings can be obtained without the use of expensive roller bearings.

TOYS MADE IN THE CLASSES OF MISS CORA B. MINER, SYCAMORE, ILL.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

FINDING THEMSELVES.

"The ideal is, every teacher a vocational counsellor." "What the average boy needs is a little encouragement." "With a little help, boys will find themselves."

These statements come from persons of some experience appointed to give vocational advice and counsel to the boys of congested districts. With such optimistic conclusions before us, our concern over the matter might be much relieved, for may it not be taken for granted that the good teacher will give the average boy a little encouragement?

Alas, we recall that but a few years ago the Bureau of Education announced that seventy per cent of all the boys were leaving school before the end of the seventh year!

We recall that various remedies for this serious condition of affairs were proposed—Vocational Training, Industrial Education, Part Time Schools, etc. Can it be that, in some mysterious, off-hand way, these remedies have been applied and have been so effective that all that is now necessary is a little encouragement from the teachers?

Then again, we read from a current magazine this statement: "We hear less of vocational training than we did—for good reason—since its utility is passing. Presently we shall hear more of avocational training, which shall give every youth destined for a mill or office a hobby for the center of his garden." Ah, so that is the situation! The inevitable occupations of humanity may be resolved into mill and office jobs, both of which are so nearly automatic that no especial training is necessary to do the work of earning a living, and the schools may be devoted to avocational betterment of the average boy.

These various statements are so various and we know so much about boys, having had to do with many, that we are inclined to doubt.

We are not inclined to believe that just a little encouragement will lead the average boy to find himself.

We do not believe that the schools have changed their work so materially that the average boy is now inclined to go to school as long as he should go or could go to advantage.

And we certainly do not believe that modern mechanical device has reduced the need of industrial and vocational education to a point where the average boy can be committed to a senseless vocation for a livelihood and devote himself to an avocation in school. These statements must be the result of a limited experience or the fancied need of writing articles for publication.

We are inclined to the belief that with encouragement there must be offered work that will appeal to boys of various interests and ambitions; work that is an evident part of the life they see about them and in preparation for that life.

We are impressed with the conclusion of A. H. Edgerton in the Industrial Arts Magazine of October: "The self-finding period demands appreciative insight into a sufficient number and variety of representative experiences to try out, discover and develop ability for understanding and doing, as well as managing and supervising industrial work."

LOVE YOUR NEIGHBOR.

Each year brings emphasis on some one necessity in education.

This year especial emphasis is put on the development of community interest. This interest can hardly be overemphasized in school affairs or business.

Percy MacKaye relates how a community drama under his direction succeeded in bringing together in leading roles, a boot-black and a millionaire. When people of diverse interests and occupations are led to some common purpose the result is often better than the fulfillment of the immediate purpose.

The community singing, the community drama, the community pageant, the community problem in school work, are the modern substitutes for the old-time barn raising and corn shucking bee. They bring together with a common benevolent purpose the butcher, the baker and the heat and light magnate; not for selfish business advantage but to develop interest in each other.

It was related in one community conference this year how the commercial club of a small Illinois town was developed into a thriving, helpful organization by a leader who saw the light.

This commercial club will not sponsor the pernicious street carnival of last year again. In place of importing doubtful entertainment for a week of revelry with the misguided idea that the merchants may profit by a rush of business, this little city will have a community performance in which many of the citizens will take part and in which all of them will take pride.

The teachers of our schools, no less than the business men of our communities, are so much concerned over the immediate success of their personal interests that they often fail to promote the common interests on which they are dependent.

Intense rivalry is not uncommon between the departments of a school. Difficulties between the teachers of allied subjects as art, home economics and manual arts are frequent.

These difficulties will be adjusted when the teachers get together and forget their personal interests in the more important interests of the pupils and the community.

The community problem in school is a fine opportunity for such cooperation. The time has come for a loss of faith in rivalry and competition as the life of education or trade.

We are not so certain as before that competition can be made fair by recognizing that life is a handicap race, for the only victory that has no element of defeat in it is the victory over self in favor of our neighbor.

MANUAL TRAINING, PAST AND FUTURE.

There was a time not long ago when teachers of manual training placed the whole emphasis on tool processes. They were concerned with the task of inducing as much skill as possible in a few mechanical operations. These operations or processes were in large measure disconnected from jobs to be done or needs to be met.

Now, the operation or process has been subordinated to its proper place. It has become an *incidental* matter—not an unimportant or neglible matter, but a consideration that necessarily *follows* the meeting of important needs or demands set by the real task in hand.

As a result of this changed point of view, we now have the enriched program in which industrial information, characteristics of materials, construction plans and methods, principles of production, etc., have a distinct and important place.

This yielding of manual training to the broader conception of education has saved it from trouble and possible elimination from the curriculum. There is yet need, however, for a liberalization of the courses in manual training. There is need of a greater variety of experience with a large number of materials. A more or less abstract course in hand woodworking is wholly inadequate.

Give manual training a rich content, a variety of materials and experiences, and a contact with real industrial life and you will have a subject that can command a permanent place in the curriculum.

ARMISTICE DAY.

Armistice day has just passed. The day has been fittingly celebrated as the time when the world not necessarily returned to sanity but where from sheer exhaustion it lapsed for a time at least from its madness.

The Eleventh Day of November will remain for all time as one of the great days of all days. On that day three years ago all hearts were turned in hope and prayer and expectation ~~toward a~~ peace that might bring solutions of many problems that had vexed the past.

New hope was held out that the war had taught us many things concerning schools and education and psychology. In the reactions that have followed, the educational world has partially lost sight of some of the most important lessons. Financial distress has aggravated the situation. The absence of some of our best teachers left the schools unable to take immediate advantage of the lessons taught. The confusion and disturbance have jostled us back into the ruts again. It will probably take another period of groping before we realize the full significance of the spirit and vitality which the needs created by the war brought to the schools. In another decade perhaps, we shall be far enough from the war to read clearly its lessons and recovered sufficiently from its disaster to undertake anew to profit by its lessons.

So, as the Eleventh of November, comes and goes through the years, we shall stop a moment and turn our faces sorrowfully yet proudly as Americans toward the past, and then with resolution and high hope face the problems of the future.

COOPERATION NEEDED.

There has always been too much dogmatism in education. The old educationists and the new educationists are exactly alike in their attitudes. For the most part, both groups are dogmatists. Neither can see the good of the other side nor the faults of their own.

The only hope for the schools and for education in general is for these groups to get together and to work together. It sounds like *pedaguese* to say that the more these groups get together the less they will be apart. But in a very real sense, the more the opposing groups come together and discuss the common problems of the schools, the less they will find themselves in disagreement.

Industrial and vocational education people and the general education people must get together and understand one another; they are both holding vital sectors in the battle line against ignorance and inefficiency. To fight with each other is to join forces with the enemy.

TITLE PAGE AND INDEX.

The publishers of the INDUSTRIAL-ARTS MAGAZINE have prepared a title page and index for Volume VI, which closes with this issue and will send a copy postpaid to any reader. Requests should be addressed to the Subscription Department, INDUSTRIAL-ARTS MAGAZINE, 129 Michigan St., Milwaukee, Wis.

TWO IMPORTANT FEATURES FOR EARLY ISSUES.

In the January issue of the INDUSTRIAL-ARTS MAGAZINE will begin two important articles which will continue through several issues of the first half of the year 1922. Foremost among these will be a treatment of the problems of *The Organization and Teaching of Industrial Subjects in the Part-Time or Continuation Schools,* by R. H. Rodgers, Specialist in Part-Time Schools, New York State Education Department, Albany, N. Y.

Reproducing Antique Furniture in the School, by Herman Hjorth, Director of Industrial Work, Baldiotry School, San Juan, Porto Rico. Illustrated with photographs and complete working drawings.

Models for Mechanical Drawing

Herman Hjorth, Director of Technical Work, Roman Baldorioty de Castro Graded and Technical School, San Juan, Porto Rico

THE teacher of mechanical drawing is often confronted with the problem of securing suitable models for his work. This problem has been solved in our school by Mr. Jose M. Garcia, teacher of mechanical drawing, in an original and satisfactory way.

The models illustrated in Fig. 1 are designed for work in elementary orthographic projection. They are all made of bristol board and developed in such a way as to give added strength to the corners, (Fig. 2). Fig. 3 shows the hexagonal prism glued together and the cube ready for gluing. The models are finally covered with white paper, which make them more distinct, bringing out all the shadows and highlights.

These models are inexpensive, easy to make, light, and at the same time very strong. Fig. 4 shows the hexagonal prism supporting a cast iron surface plate weighing 35 lbs. They are not damaged if they fall on the floor, and they are suitable both for mechanical and freehand drawing.

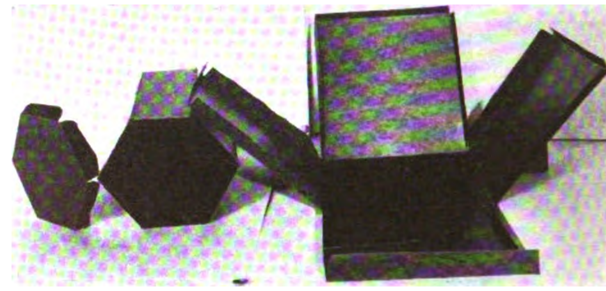


FIG. 3.

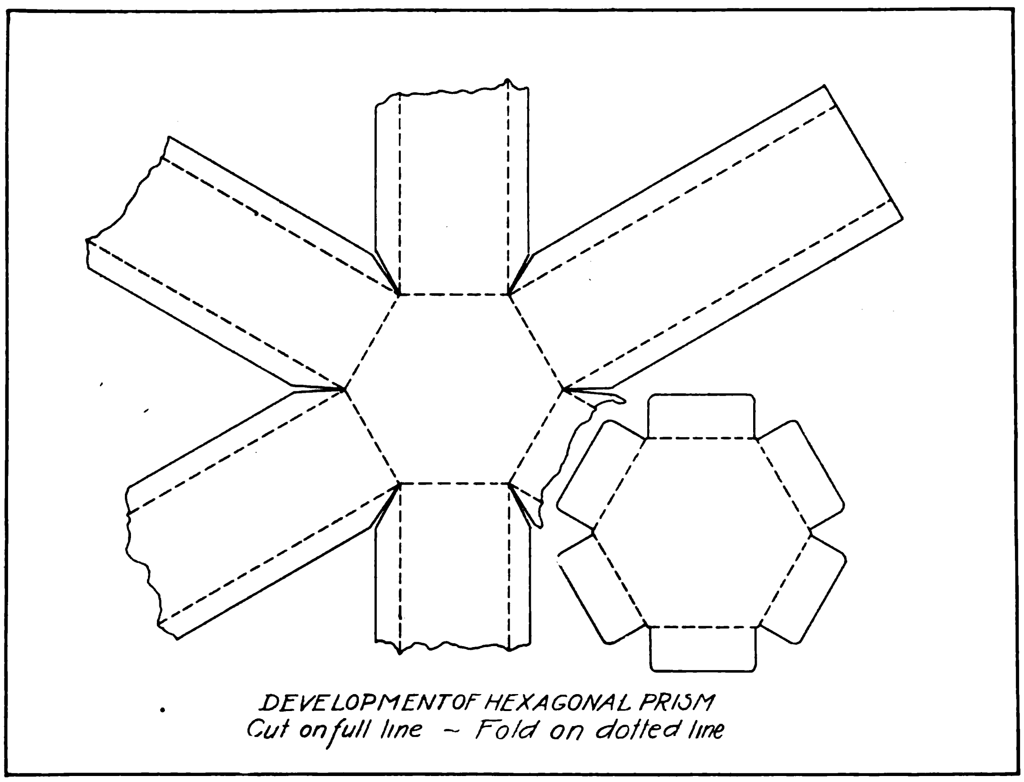


FIG. 2.

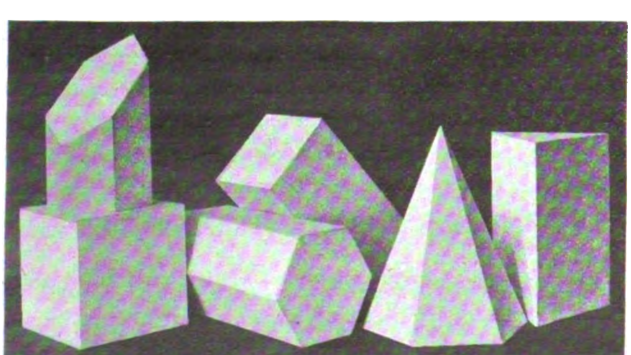


FIG. 1.

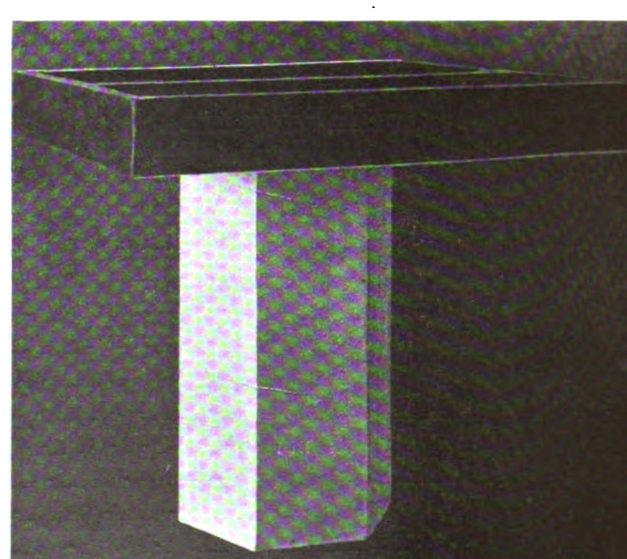


FIG. 4.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

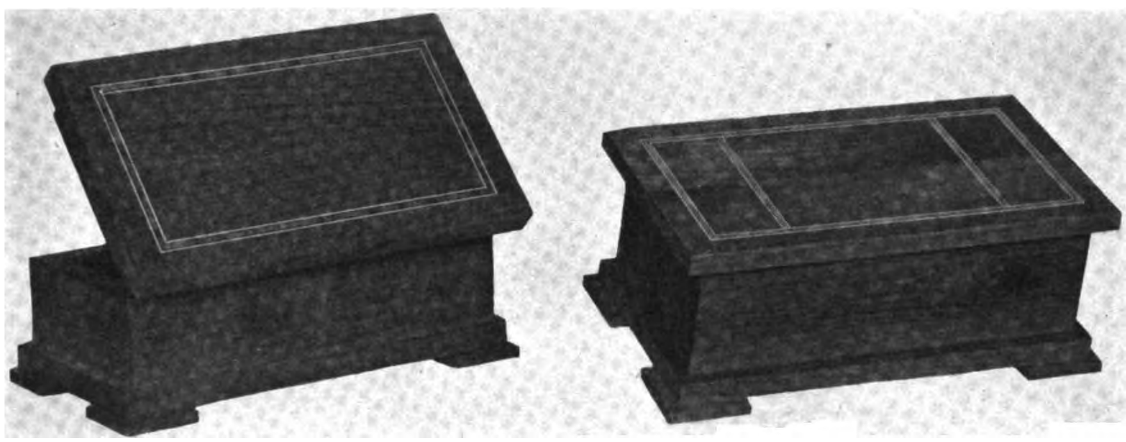
CHRISTMAS PROJECTS.

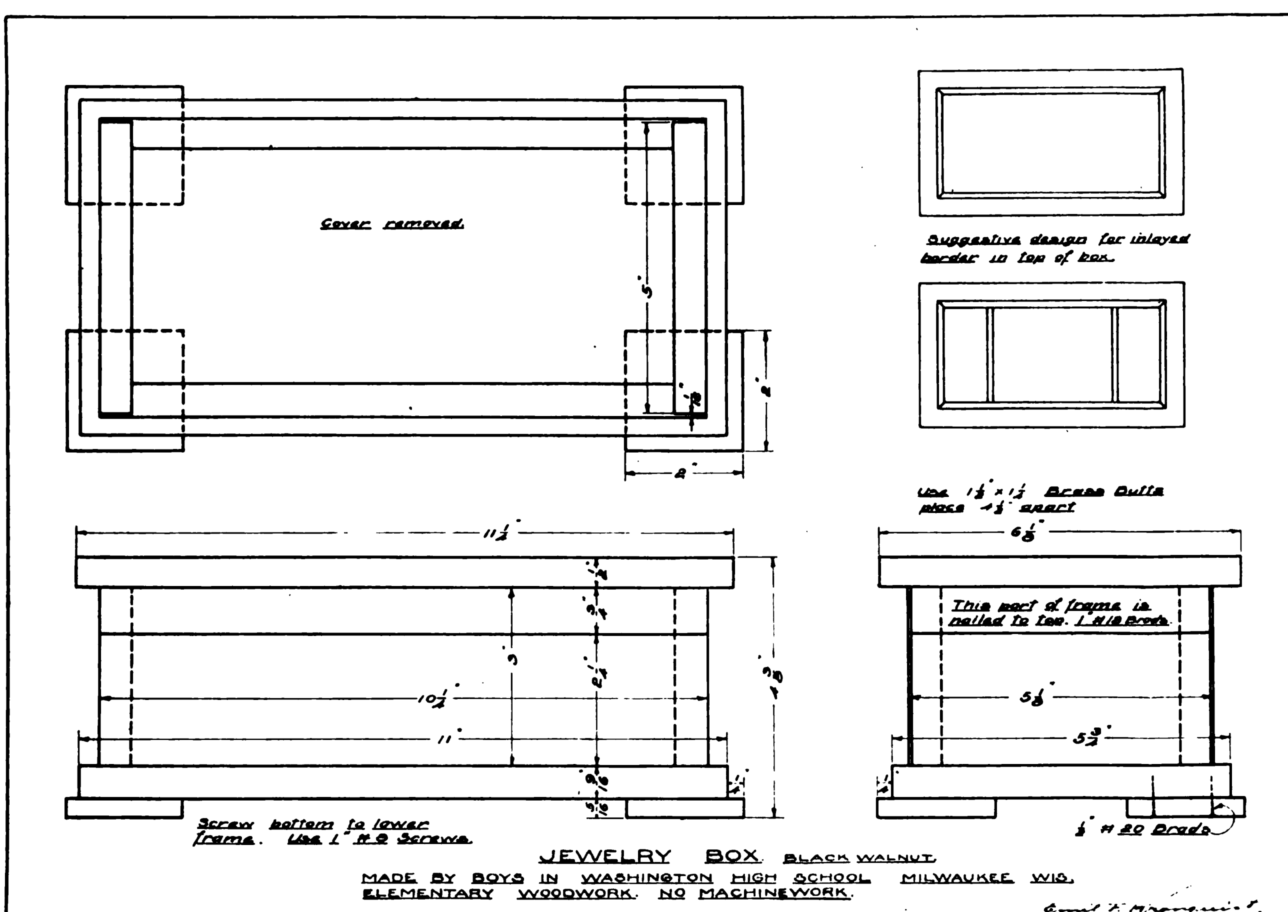
Emil F. Kronquist, Milwaukee, Wis.

Bud Vases.

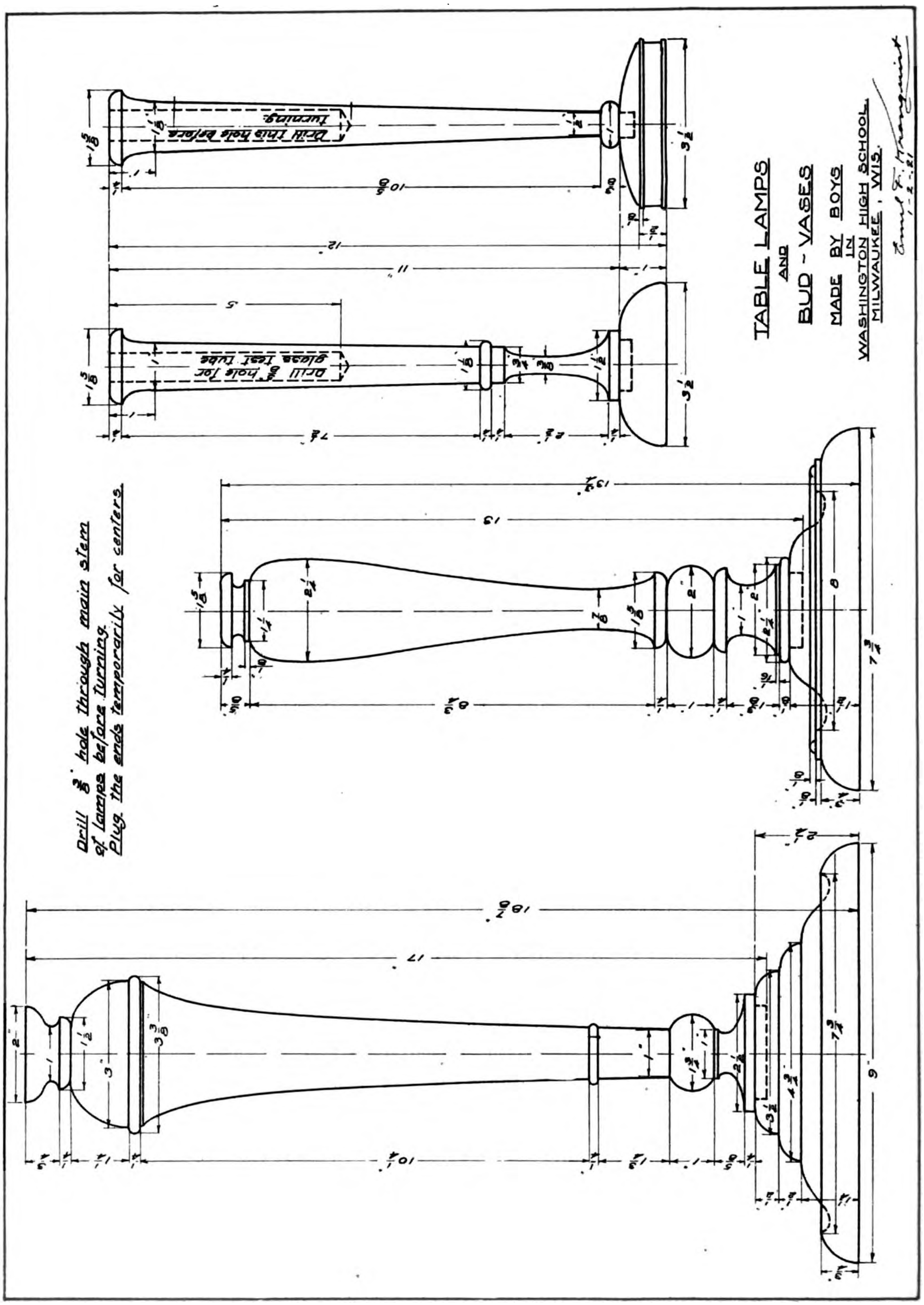
After the preliminary exercises have been made to familiarize the boys with the different turning tools and methods, this problem is attractive and interesting, and affords the teacher a good chance to point out the difference between good curves and bad curves.

The steps in turning should be carefully followed; no haphazard method allowed. Always make it a point to outline the steps as in Fig. 1.





BOXES DESIGNED AND MADE BY MR. KRONQUIST'S CLASSES.



Drill the hole for the glass test tube first on the lathe, using a drill chuck and a twist drill. If made of black walnut, finish by an application of Bicromate of Potash (make a saturated solution of Bicromate of Potash and water), then a dark filler and two or three coats of wax.

Book Ends.

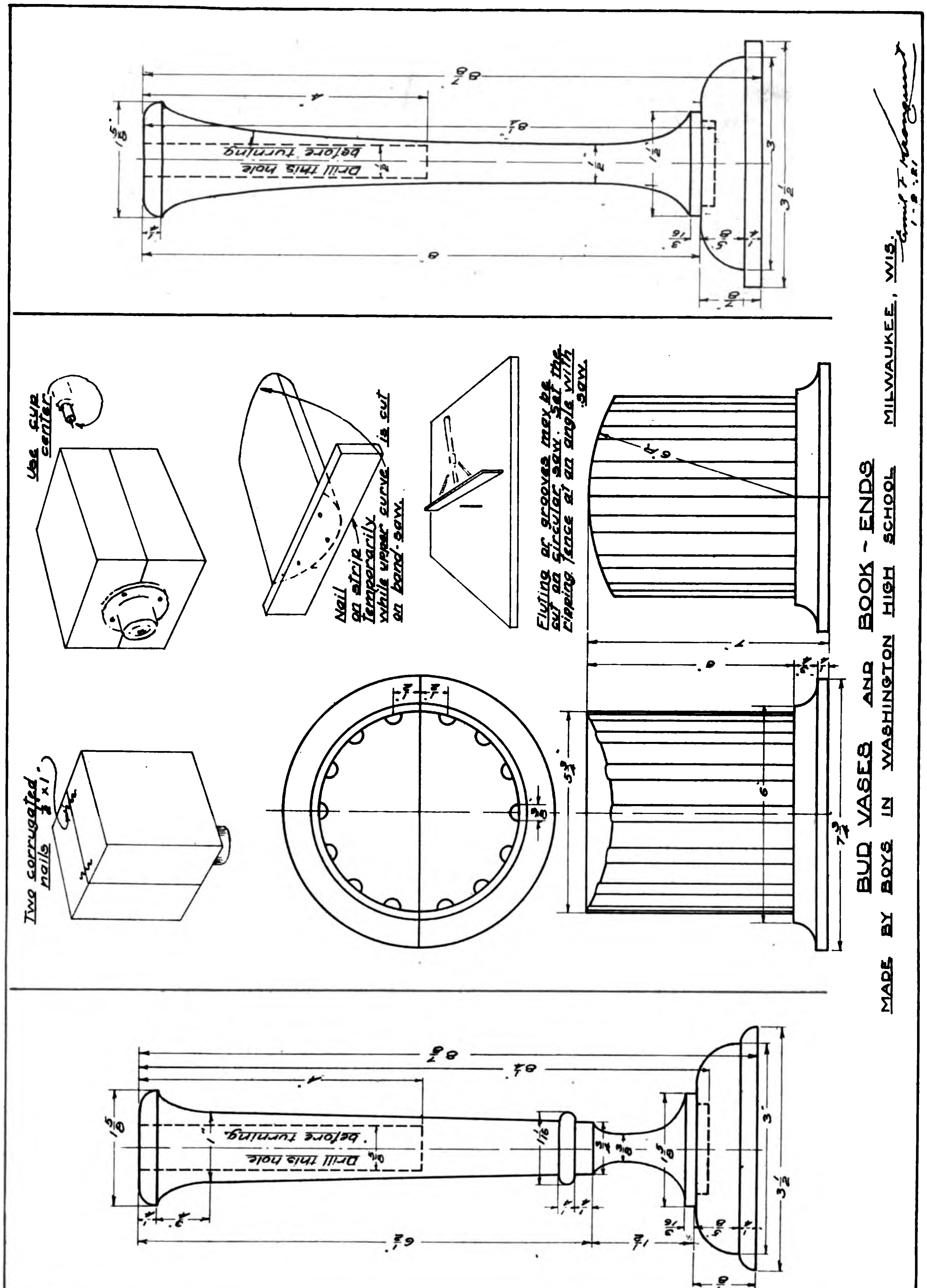
This problem is somewhat difficult and requires great care in preparation, but it is not beyond the ability of the average boy.

If made of black walnut it makes a very handsome piece of work and it is also very practical.

Jewelry Box.

This box was made as an experiment in the elementary woodworking class (first semester freshman in high school who are not allowed to do machine work). It turned out beautifully and a great deal of enthusiasm for the work was created. It was made of black walnut and given as a class project to a class of 22 boys.

To inlay the border prepare a few marking gauges to cut a good clean line, then cut with chisel across the



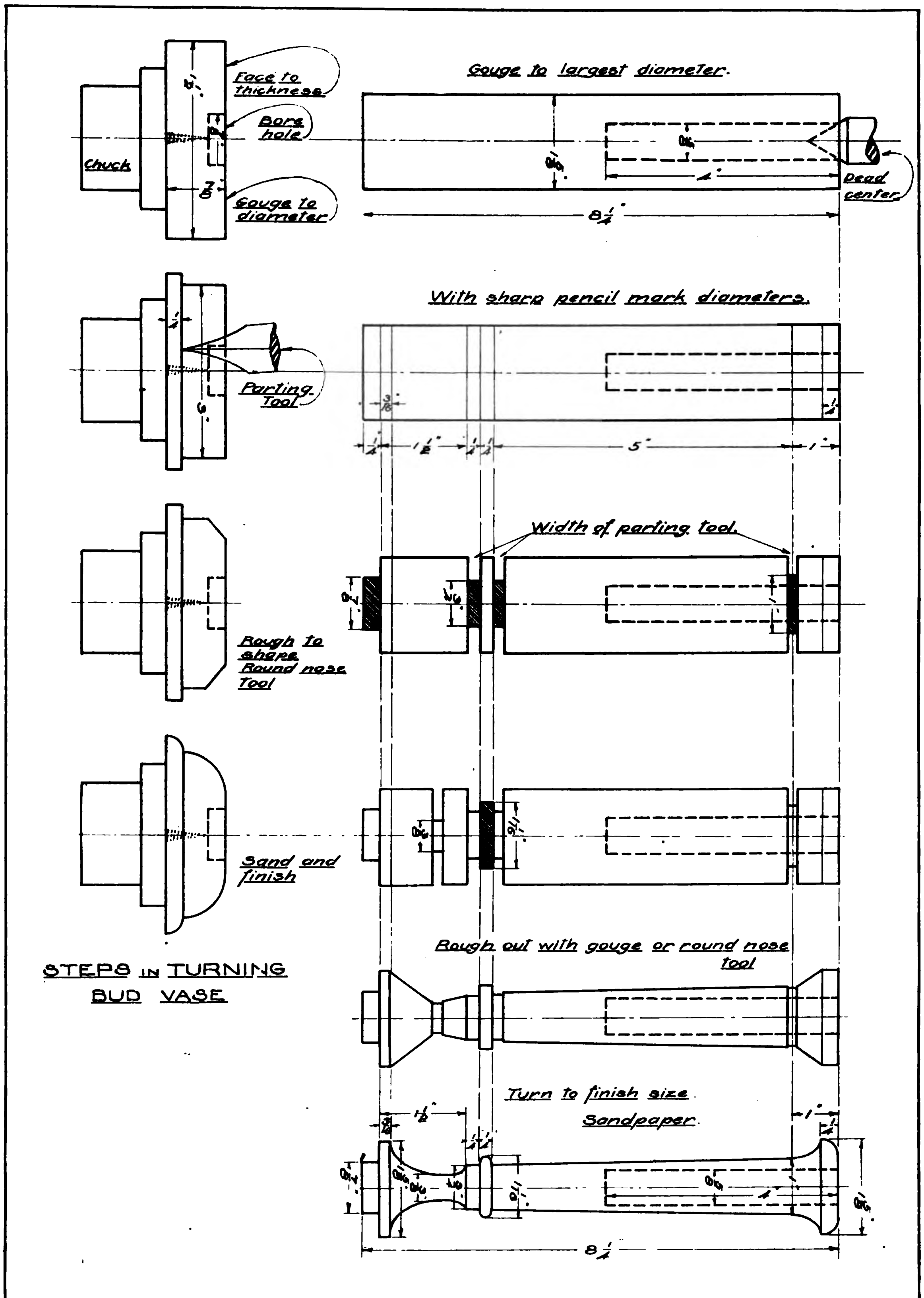
grain a shallow trench and fit in border. In gluing in border use a not too thin hot glue, cover with a piece of paper and a board, then clamp. The top can be planed down without injury to border, if the tool is sharp and shallow set. To finish, apply two coats of white shallac, then two or three coats of dark prepared wax. It would perhaps be of interest to know that the inlay borders can be obtained from J. Bernard & Co., 422 E. 53rd St., New York, at a very low cost. The most exquisite border can be had for about ten cents per yard. A few samples, I am sure, can be obtained for the asking. The border shown in box 1 is No. 81½ costing seven cents per yard. No. 2 is border No. 681.C, costing eight cents per yard.

TWO PROJECTS IN BENCH METAL WORK.

Eber L. Moore, Connersville, Indiana.

The Kettle Stand illustrated in the accompanying working drawing is an excellent problem for agricultural metal working classes. The stand can be used for holding milk pails, but is better adapted for holding heavy kettles.

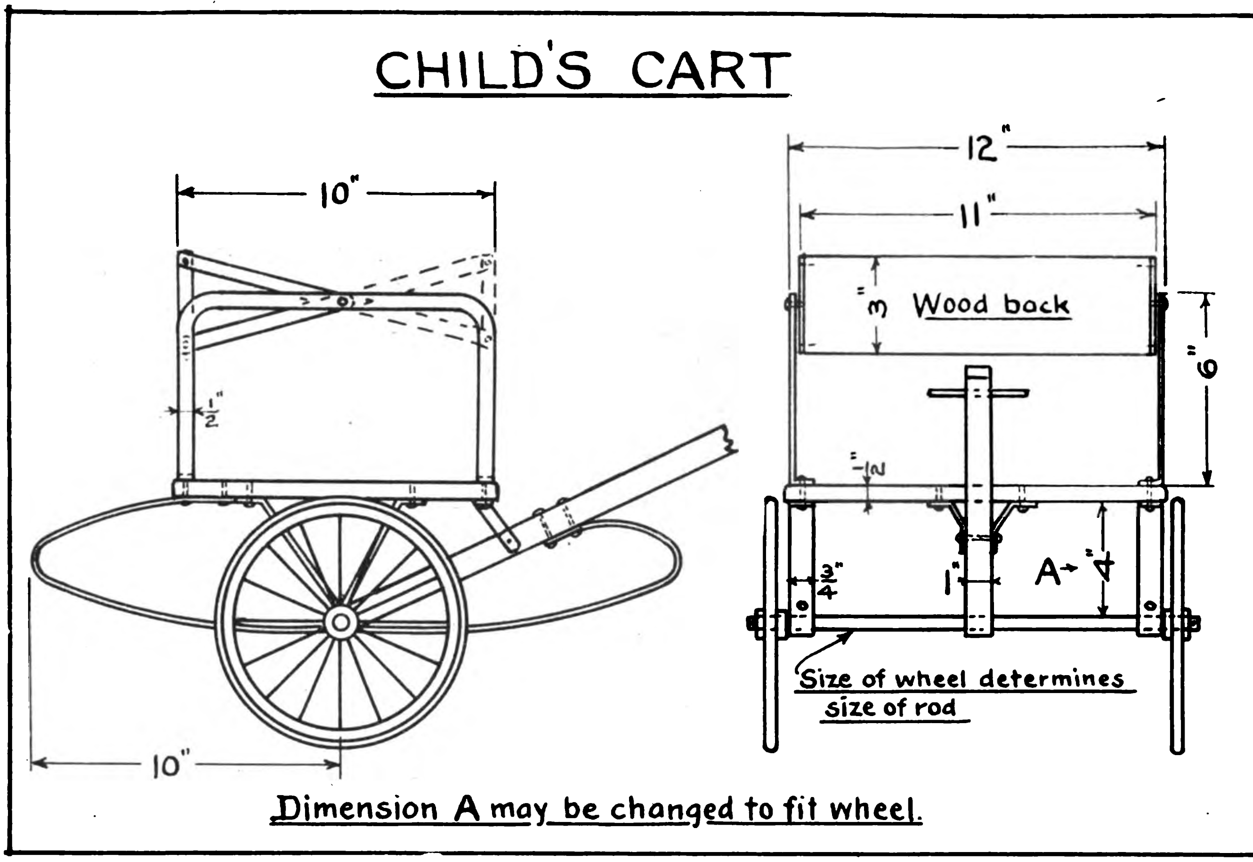
The stand is made of ¼ inch by 1 inch strap iron.

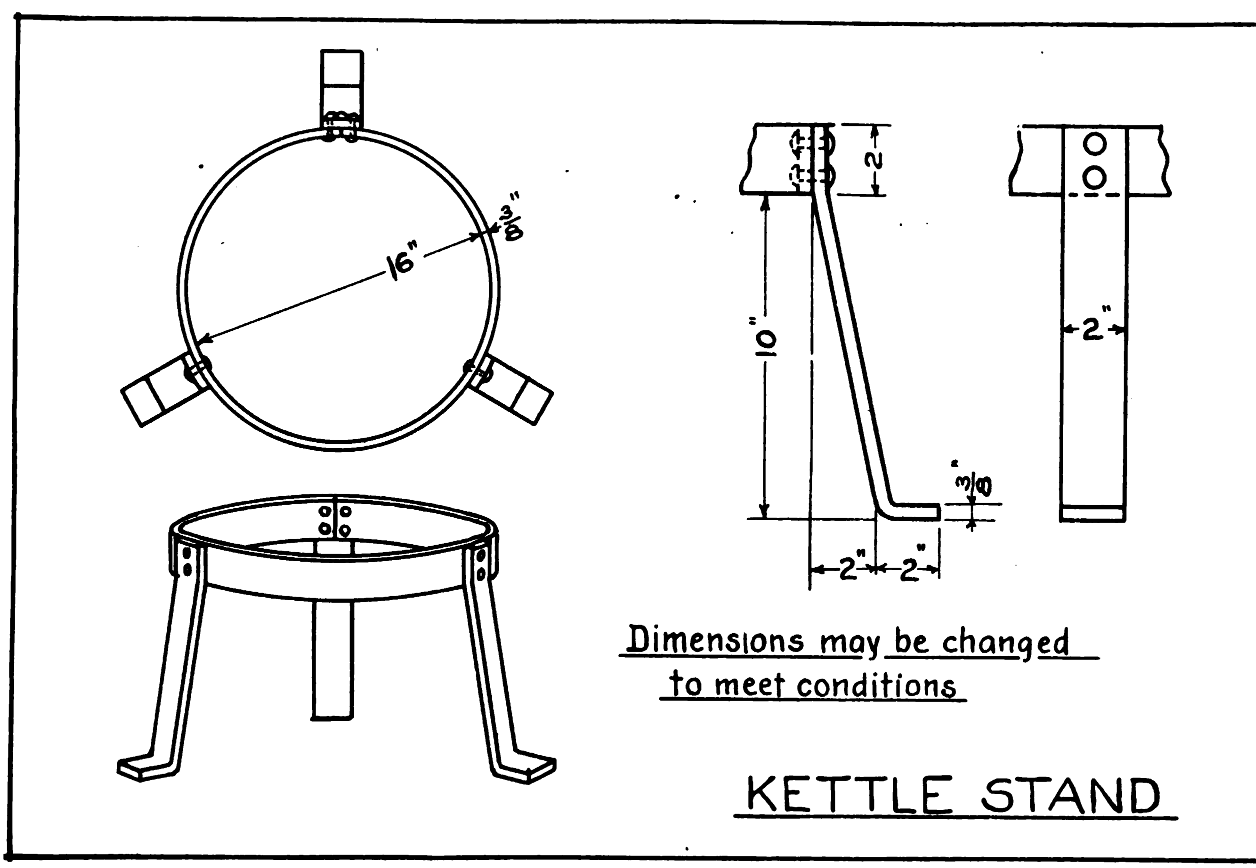


All the bending and fitting with the exception of the right angle at the top may be done cold. Care should be taken to get the legs exactly alike. A circular template of wood should be made to shape the circle that connects the legs.

Child's Cart.

The childs cart is a little complicated in its assembly, but simple in its construction. A set of wheels should be at hand before starting this problem. The first step in the problem would be the chassis construction. A steel rod determined by the size of the wheel axle, should be cut to the length 12″, plus the width of the hubs of the wheel, plus ½″ for keys to hold wheels on. The two V shaped brackets on which the seat is to be fastened, should be made next. The bottom part is shaped around the axle and a rivet placed just above. The arms of the V shaped bracket are bent at 45° to axle. Next the bumper, which fastens to the handle at two points and to the rear of the seat should be made. There is no definite shape for this and its length is based upon the height of



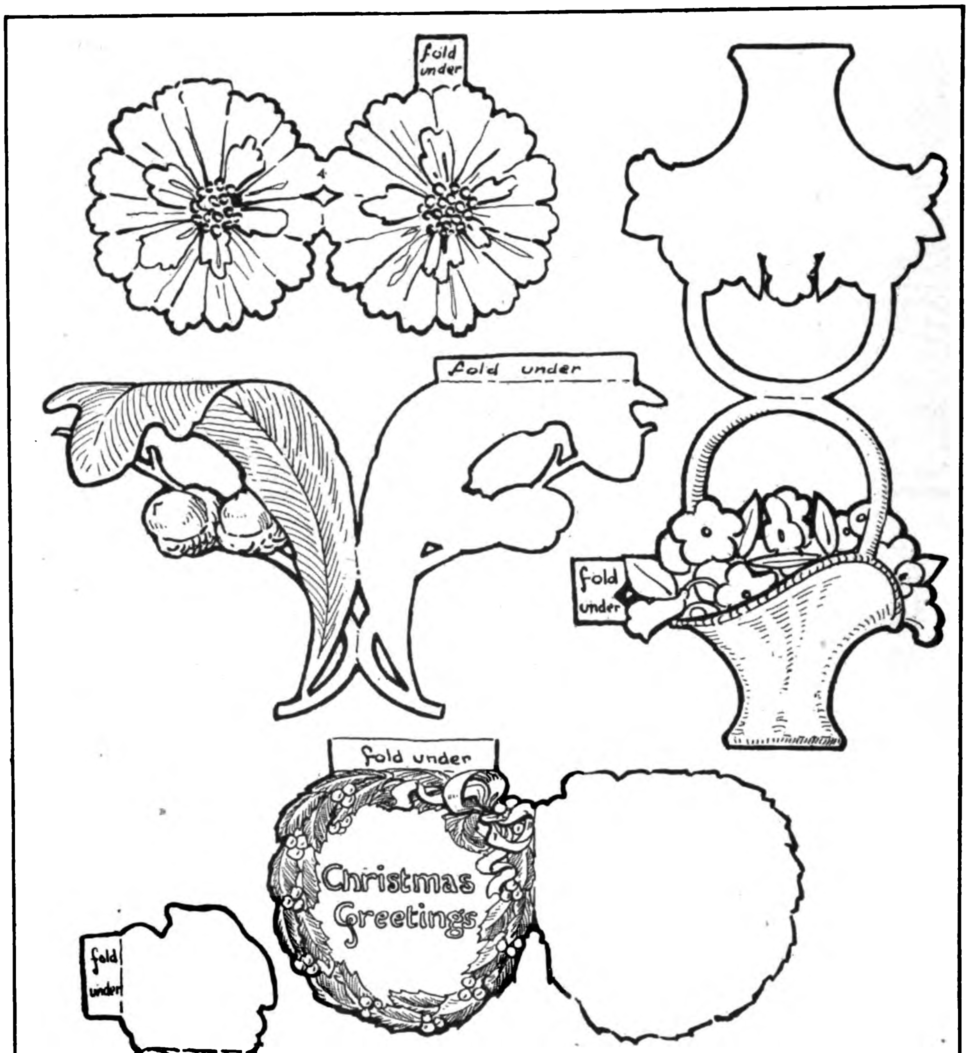


the wheels. Two small braces to hold the handle in place should be made of 5/8" strap iron twisted in the middle, so that one end fits flat against the sides of the handle and the other ends fit against the bottom of the seat.

The arms are made from 1/2" strap iron, the upper corners should be heated when bended.

The reversible back is hinged at the middle of the arms and is kept from dropping down when turned, by a small angle iron projecting from the inside of the arms. The back and bottom should be made of a well seasoned wood 1/2" thick. The handle is connected to the axle by means of a hole through the end of it and the axle placed through the opening.

Care should be taken to have all duplicate parts exactly alike. This will eliminate all trouble in assembly.



Bookmarks to be slipped over corner of page

AN EDUCATIONAL BOOKMARK.

Catherine M. Richter, Long Beach, Calif.

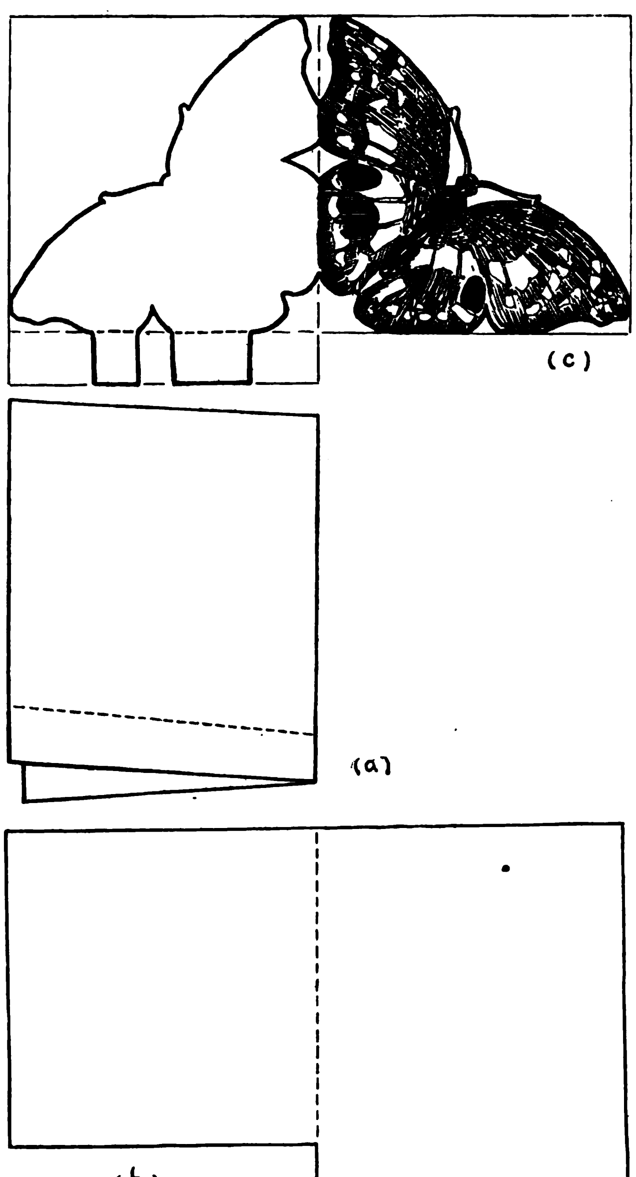
The accompanying problem is a simple one, which can be used by the teacher of the lower grades as well as the more advanced. The children make something which is attractive, which is useful, and which they will have worked out for themselves. A bookmark is something which can be made at any time during the year, to fit certain occasions or used to fill in between seasons.

In developing this project, interest can be inspired in the children if the teacher previously makes two or three examples, and displays them before the class, demonstrating its use by slipping one of them over the corner of a page of a book. If she then starts a large drawing on the board, evolving it as the children work, it saves unnecessary talking; a well-drawn picture often tells the story better than words alone. Before allowing the children to start work, it would be well to make one model before them, where they can see the development. From here on, the children take the work into their own hands, working first with used paper, or inexpensive construction paper, until they have obtained the best possible results; the finished article should then be made from good paper. The class might work out the design the teacher just completed, and then evolve ideas of their own, in the way of design.

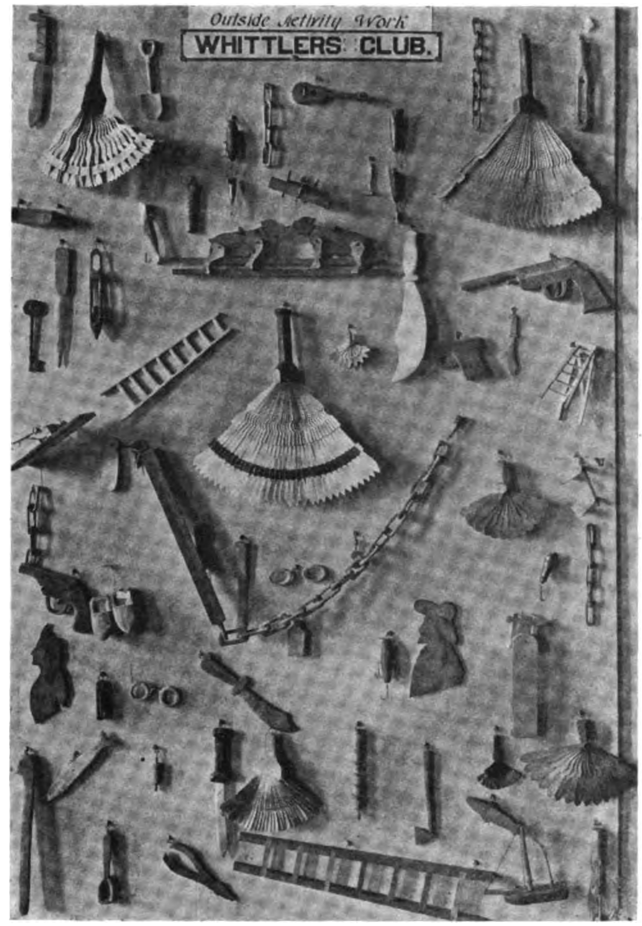
These bookmarks require little measurement—the drawing of but one line by rule. The balance is but a matter of folding and cutting, drawing and perhaps coloring. All paper should have been previously cut; the instructor must first determine what is to be worked out in a general way, in order to decide on the size of paper required. For instance, the oak leaf, butterfly and basket type of bookmark require more material than the flowers, hearts and wreaths. For anything about the size of the flowers, an oblong $2\frac{1}{2}''$x$4''$ would be the proper size. The edges should be straight and true. Taking one of these long slips of paper, fold the two short edges together, crease the fold; this is a simple way of obtaining a right angle. Many ideas can be developed for this use, but they all must be capable of being beautifully arranged in a corner, that is, in this right angle. The teacher, if working on the board with the children, will first draw a large oblong to represent the slip of paper; she then erases half of it, to show the folded portion (a). Measuring up from the now short side of the folded paper $\frac{1}{2}''$, the pupils draw a line parallel to this short edge; open out the paper and cut away the half inch strip up to the fold

(b); the remaining ½" extension forms the "paster". This is the foundation from which all these bookmarks are made (c).

The making of the design should constitute another lesson, using other paper, for instance two-inch squares for the 2½"x4" oblongs, being certa'n the corners are right angles, so as to be sure that the bookmarks will fit the corner of the page. The children should first work out the same design the teacher used in demonstration. Then at the blackboard or on paper, they should work out many patterns, being careful that the design touches the two sides of the right angle. Select several of the best designs produced by the pupils and explain why they are good for the purpose; also pick out a few of the poor ones, showing their faults and what to avoid. For general purposes, nature objects are good-flowers, butterflies, leaves—especially those brilliant in color will be found pleasing. For special occasions, hearts, shamrocks, Christmas wreaths and bells, patriotic shields, and a turkey with outspread tail. A Japanese fan in black outline and bright pattern could be prettily placed in a corner. Upon obtaining satisfactory designs, they can be cut out and traced around, or redrawn into the corner of the oblong made the previous lesson. The simplest and surest way is to draw in but one corner of the oblong, then fold down the opposite side, and cut the two at one t'me. The



BOOK SLIP.



WORK OF THE WHITTLERS' CLUB, FORT DODGE, IA.

third lesson should be the making of the best patterns of the lesson previous on heavy construction paper, or if to be colored, on good drawing paper. Then color, if desired, cut them out, being sure not to cut away the extension for pasting the two sides together, fold and paste the extension in between the two sides. In almost every instance, the accepted bookmark should be the child's own pattern; then the teacher will have the satisfaction of knowing that her pupils have conquered a problem rather than the making of some particular thing, the good of which ends with the making thereof. She is giving an education rather than just making them skillful.

USING OUTSIDE ACTIVITY WORK.

The accompanying illustration shows some of the Whittling products of the Whittlers' Club, Fort Dodge, Ia., and is printed here through the courtesy of Mr. John M. Bice, Instructor of Manual Training in the Fort Dodge high school.

As a means of interesting the boys in the sixth, seventh and eighth grade shops, which are under his direction, Mr. Bice last spring organized a Whittlers' Club. The purpose of the club was to give boys a useful activity for holidays and vacation periods and to give them a means of physical and mental development. The club met once every three weeks during the school term after regular school hours and received instructions in the use of the knife. This included the proper position to take, the correct way of holding the knife and the selection of wood. Time was given to the planning of useful toys and household articles which could be made entirely with the knife. Most of the articles were out out of soft pine of the best quality, straight grain kiln dried and planed. Mr. Bice found that the work was done with great interest and it was visibly effective as a means of training the hand and the eye.

CONSTRUCTIVE WORK IN CINCINNATI.

Pupils and teachers in the Department of Industrial Arts in the Cincinnati schools produced during the summer vacation of 1921 furniture and building repairs in the city schools to the value of $13,000, effecting a saving of nearly $3,000 and affording valuable educational experience for summer classes.

Under the direction of Mr. Elmer W. Christy, the shop classes in the summer schools were organized on the basis of productive work, operating eight hours per day. Among the jobs undertaken were the building of 53 flat top standard desks for teachers, twelve drawing board cabinets for high schools, benches for sheet metal shops, electrical shops and forge shops, six portable wardrobes, two lunch room steam tables. The boys rebuilt and refinished 96 lunch room tables, 90 drawing tables, and cleaned and varnished 650 chairs. They repaired lockers and 36 wood turning lathes, which after thirteen years of use were ready to be discarded. They also completed the construction of six wood turning lathes, and built 34 belt shifters. The class in electrical wiring wired nine double rooms and eight single rooms and changed the wiring in one portable school building.

In describing the work Mr. Christy writes:

During the regular school year the program provides only from one and a half hours to three hours per day for shop work for any student and the work is therefore intermittent and non-intensive. During this period it is our aim to train in the general principles of the various trades. The purpose of the summer work was to provide for those boys who have shown themselves most apt an opportunity to appy those principles in a practical way under conditions as nearly like commercial shop conditions as can be provided in a school. The results were that they acquired not only considerable skill but a large amount of practical information concerning the branch of work in which they were engaged.

"In organizing classes we employed only boys who had previously received instruction in the principles of the trade which that class represented. Co-operative students who were ready to go to work in commercial shops and for whom positions could not be found were given preference in the school shops. Their number being inadequate we employed boys from the regular industrial arts course. The rate of pay was 20 cents to 25 cents per hour, eight hours per day.

"The teachers were in all cases not only skilled in the art of teaching but practical workers in their particular trade. The work passed through the shops in units and considerable repetition was involved. The large number of different operations to be performed however, and the shifting of the boys at frequent intervals enabled each boy to receive instruction in a great many more operations than he would in a commercial shop in a much longer period. While we were organized for and worked for efficient production we did not lose sight of the educational side of the work.

"We gave each teacher from eight to ten boys and this average was maintained throughout the period. In this respect our organization differed from those in some other cities where teachers only are employed to do this class of work. We can say with assurance that our product is the result of students' work.

"We feel sure that the quality of the work will pass rigid inspection, in many cases be found superior to that which would have been received from commercial establishments under competitive bidding. One of the most delightful features of the summer work was the splendid attitude of both teachers and students. I feel sure that those who were kind enough to visit the classes while in operation appreciated the vigorous way in which the work was being carried on and the joy which the students were experiencing in the creation of a really commercial product.

"In figuring costs we have included the boys' wages, teachers' salaries, cost of material, cost of supervision and services of a millwright. We have not included the cost of operating the plants nor the depreciation of equipment. The market value of products is however, a very uncertain quantity. In the matter of teachers' desks we used the figure which the Board would have had to pay at the time the order was placed; for the drawing board cabinets we had a bid of $180 each while we figured them at $160; for the new part of the serving counter at Woodward we had a bid of $400 but for additional work raised the value to $500. For the electric wiring we figured each room at $150. Taking into consideration bids for similar work and the better fixtures used this seemed reasonable. On other orders we have made estimates which we believe to be conservative.

"For the summer work the final report indicates the following:

Salaries and wages	$ 6 017.22
Materials	4,176.65
Total	$10,193.87
Value of product	$13,046.00"

VOCATIONAL EDUCATION BEING DEVELOPED IN BERKELEY.

Vocational Education at Berkeley, Calif., has been in process of development for the past three years. The first classes were part-time classes in home economics.

The director of vocational education who was appointed in May, 1920, is also general administrator of all vocational and part-time education in the city and is responsible for the supervision of industrial work. Since the first of May, 1920, the number of special industrial teachers in the city has been increased from ten to 21. In the sixteen elementary schools, the industrial work is

DRAWING BOARD CABINETS MANUFACTURED BY THE INDUSTRIAL ARTS DEPARTMENT, CINCINNATI SCHOOLS. Elmer W.Christy,Director.

correlated with instruction in other school subjects. In the fourth, fifth and sixth grades the class teacher, who is also the teacher of art, spends half the time during which her pupils are receiving home economics and manual training, with each of the special teachers. The purpose is to offer a definite opportunity for correlation of class instruction with special subjects.

In the junior high school, the industrial work is being developed in conformity with the general program now under way to make the school an "exposure and occupational finding" laboratory. In the prevocational industrial department, instruction is offered in mechanical drawing, printing, electric shop practice, wicker furniture construction, radio, carpentry, shoe repair, cabinet making, cement work, pipe fitting, elementary plumbing, painting and finishing. During the coming year it is planned to introduce courses in machine shop practice and automobile repair in the junior high school.

In the senior high school, instruction is offered in printing, machine shop practice, cabinet making, carpentry, pattern making, automobile repair, electric shop practice, mechanical drawing and related subjects. The industrial work is of two types, namely, academic and vocational. At the present time, seven vocational industrial classes are provided in the subjects of printing, machine shop practice, electric shop practice, mechanical drawing, pattern making, automobile repair, in addition to a number of part-time vocational industrial classes.

Recently two full-time vocational home economics classes were organized. One of these is a cafeteria management class in the senior high school, and the other is a vocational home making class in the Burbank Junior High. A total of fifteen part-time vocational home economics classes are also in operation. The commercial classes while not operating under Smith-Hughes regulations, are practical courses of training for certain commercial occupations.

In addition to the full-time courses, special opportunities are being offered in the part-time high school for short intensive periods of work. There are also a number of part-time vocational commercial courses for the training of stenographers and bookkeepers. Practically all of the courses mentioned are in operation in full-time, part-time and evening high school classes.

EASTERN ARTS ASSOCIATION PREPARES FOR MEETING.

A meeting of the council of the Eastern Arts Association was held in New York City on October 15th, on the call of President F. P. Reagle of Montclair, in order that plans might be made for the next or twelfth annual convention of the association at Rochester, N. Y. It was decided to place the dates for the convention on Thursday, Friday and Saturday, April 6, 7, 8, 1922. This is a change in the previous custom of having the meeting include Good Friday. It was made in order that members of the association might have the opportunity of visiting the Rochester schools while they are in session.

The main topic of the program will be—"The Place of the Manual, Industrial, Household and Fine Arts in the Junior High School." This type of school is one of the features of the Rochester school system, and the work of these schools should prove most interesting to the visitors.

The slogan of the program and membership committees is to be—"Each And All—Rochester—1922". Miss Frances Bachelor, vice-president of the E. A. A., who is chairman of the program committee, made a report showing progress toward securing speakers for a most interesting program.

James F. Barker, assistant superintendent of schools of Rochester and a member of the council of the E. A. A., was appointed chairman of the Rochester local committee. Mr. Barker is to organize the various committees necessary to the success of the convention.

Merritt W. Haynes, secretary of the E. A. A., tendered his resignation, which was reluctantly accepted by the council. Mr. Haynes is to leave the position which he has held for many years as principal of the Bayonne (New Jersey) Vocational School to go to Indianapolis to assist Director Hawkins in the educational program of the Typothetae.

MR. FRANK E. MATHEWSON,
Jersey City, N. J.,
New Secretary of the Eastern Arts Association.

It was then decided to combine the work of the secretary with that of the publicity chairman, and Frank E. Mathewson of Jersey City, a former president of the E. A. A., was elected secretary.

There are now seven hundred members of the E. A. A. and a strenuous effort is to be made to increase the membership to twelve hundred before the Rochester convention.

The Council then adjourned to meet again in Rochester some time during December.

FIFTEENTH ANNUAL CONVENTION.

The fifteenth annual convention of the National Society for Vocational Education will be held January 5, 6, 7, 1922, at Kansas City, Mo. The meeting which promises to be one of the largest in the history of the Society is in charge of Mr. C. A. Prosser, chairman of the program committee.

It is planned to devote two full days to sectional meetings on agricultural, industrial and commercial education, home making training, part-time and continuation schools, training for the industry, industrial rehabilitation and teacher training for vocational classes.

The general sessions of the convention will occur on the first day and the business session will take place on Saturday, the last day of the convention.

One of the features of the convention will be an extensive exhibit of plans and specifications of buildings constructed for vocational school purposes. The exhibit will include floor plans, elevations, photographs of exteriors of buildings and special interior features, construction data, and number of pupils to be accommodated in buildings. Hundreds of buildings for vocational purposes are to be erected during the next five years and the exhibit is intended to meet a demand for information regarding building construction.

Another feature will be an exhibit of vocational material in the form of mimeographed, typewritten and printed pamphlets on the subject of agriculture, commercial and industrial education, home making and teacher-training work.

WISCONSIN MANUAL ARTS MEETING.

The Manual Arts Teachers of Wisconsin met at Eau Claire, Wis., on October 21st, with Mr. Clyde A. Bowman as chairman of the meeting.

Mr. H. C. Thayer of Stout Institute spoke on the subject of "Grading and Promotion on Ability in Mechanical Drawing;" Mr. Charles Beardsley, of Eau Claire, discussed "Professional Lessons for Manual Arts Teachers from Vocational Classes," and Mr. Hans W. Schmidt, State Director of Manual Arts for the State, took for his topic, "Wisconsin Manual Arts."

MR. BAXTER AND THE WINNING TEAM.

WIDE AWAKE CLUB HANDICRAFT TEAM WINS FIRST HONORS.

St. Johnsbury Boys Lead Among Twenty-Eight Teams.

The Handicraft Team of the Wide Awake Home Project Club returned from Camp Vail, Springfield, Massachusetts, after a successful week at the Eastern States Exposition.

Professor Jenkins of Delaware, who judged the demonstrations of all the teams, remarked that the team work and finish of the team was the best he had seen. The great point brought out was that it was not merely a team trained to exhibit before an audience but was a team which showed by the photographs, taken during the past year, the work actually done by the club.

One of the projects demonstrated was the mixing and placing of a section of concrete walk and by explanations showed the many practical ways concrete could be used on the farm. Various walks laid by the club members for people in and around St. Johnsbury were clearly shown by photographs. Other projects demonstrated were the making of some dozen or more knots and splices and how they could be applied on the farm, the sharpening of scissors, sharpening and care of farm tools, the preparation of wood for finish, showing the sanding, staining, filling, varnishing and polishing of the same, and the method of removing and repacking a leaky faucet.

The boys were the youngest team at the camp, their ages running between 12 and 13 years. Mr. Farley, State Club Leader of Boys' and Girls' Club work for Massachusetts, remarked when presenting the medals, that it was a foregone conclusion that the Vermont team would win first prize as they had never been beaten in the five years that the Eastern States Exposition had been running.

The boys behaved like veterans before the large crowds and spoke clearly and to the point and instantly answered all questions asked in a convincing manner. In the judging the boys scored first with a total of 260 points, the highest of any team, one boy scoring 94 and one-half points. In demonstrating the St. Johnsbury team scored the highest of the 28 teams representing the very best club members of the North Atlantic States, having a total of 96 per cent.

The week spent at the camp was of a vital educational nature. Brought in contact as the boys and girls were with the select of the other states, it meant that they had to show exceptional ability to be returned winners. The opportunity to see some of the world's finest cattle and products, the chance to hear lectures and demonstrations by expert men and women in various lines of industrial life brought the subject directly to them in a far more vital and interesting way than a similar subject could ever be presented in the classroom.

If only those people who do not clearly understand the wonderful character of club work could have been with the boys and girls at Camp Vail they would have seen why Uncle Sam, together with State College and State Extension Service, backed boys' and girls' club work to the limit and each and every one will be a booster for this great work.

TECHNICAL COURSES IN NOVA SCOTIA.

The Nova Scotia Technical Institute, at Halifax, stands at the head of the technical education system of the province of Nova Scotia. Four-year courses in mining, electrical, civil and mechanical engineering are given which lead to the degree of bachelor of science in engineering. Short courses of three months are offered during February, March and April to men engaged in land surveying, steam engineering, machine design, architectural drafting, structural steel drafting, electrical machinery, coal mining engineering, metallurgy of steel, technical chemical analysis and assaying.

Coal mining evening technical schools are carried on each year during the winter months in fifteen coal mining districts, giving instruction in the preparatory subjects.

Evening technical schools established since 1908 offer instruction in preparatory English and arithmetic, practical and shop mathematics, single and double-entry bookkeeping, dressmaking, millinery, household management, architectural drafting, electricity, land surveying, industrial chemistry, building construction estimating, machine shop practice, and ship drafting. During the past year two new divisions in fisheries and correspondence study have been added. The fisheries schools are conducted in fishing districts and offer instruction in navigation, marine gasoline engine operation and repair, fish handling and curing, marine business and first aid.

The correspondence division offers instruction by correspondence to the rural population in the subjects of elementary English and business English, business arithmetic, bookkeeping, salesmanship, accounting, mathematics, steam engineering, automobile mechanics, heating and lighting for janitors, plumbing, practical mathematics for electricians, electric wiring, mechanical drawing, machine design, blue print and plan reading, estimating, architectural drawing.

The director, Mr. F. H. Sexton, and the assistant, Mr. G. A. Boate, are graduate engineers and have received their education in mechanical and electrical engineering. They have an international reputation for their advanced work in engineering and education.

NEW BOOKS.

Lessons in Lettering.

By Thomas E. French and William D. Turnbull. Paper, 40 pages. Book I. Price 35 cents. McGraw-Hill Book Co., New York, N. Y.

This book is made up of a series of lessons and practice exercises in single stroke gothic lettering, such as is used widely in mechanical drawing. The book wastes no space in preliminaries but describes the construction of the several letters and gives practical directions for doing the several exercises. The letters have been grouped according to straight and carved lines as well as capitals and small letters. Due attention is given to spacing, to the special problems of paragraph writing, dimensioning, map lettering, symmetrical titles, etc. The book appeals to us as the most readily teachable book produced up to this time.

Wood Turning.

William Fairham. The Woodworker Series. Cloth, Octavo, 150 pages. J. B. Lippincott Co., Philadelphia.

This book described the usual processes of spindle and chuck turning and goes into considerable detail on such advanced forms of work as split, spiral, hollow, ball and square turning.

Bethlehem Trade School News is the title of a school publication issued by the printing class of the Bethlehem, Pa., Trade School for the annual graduation. The contributions, except for a brief history of the school, were made by the boys and reflect the activities of the machine shop, electrical, woodworking, science and academic departments. Mr. James C. Tucker is director of the publication.

RECEIVING THE RETURNS OF THE WORLD SERIES.

RECEIVE WORLD SERIES RETURNS BY HOME-MADE WIRELESS TELEPHONE.

About three days before the opening game of the World Series of New York it became known among the students of the East Orange high school, that returns of the games were to be announced by wireless telephone, play by play. The interest became so great that it was decided to hook up the home-made wireless apparatus, which the high school has, to build a bulletin board and to give the returns to the school.

Under the direction of Mr. E. W. Tuttle, head of the Manual Arts Department, the project was worked out. The class was devided into groups and about fifty boys rendered some service in connection with the work. About fifteen hours' time was spent in preparing the entire apparatus, including the putting up of the aerial, the connecting of the wireless apparatus, the planning, construction and painting of the bulletin board, the studying of methods of operation, and the printing of cards for the various players, tallies, etc.

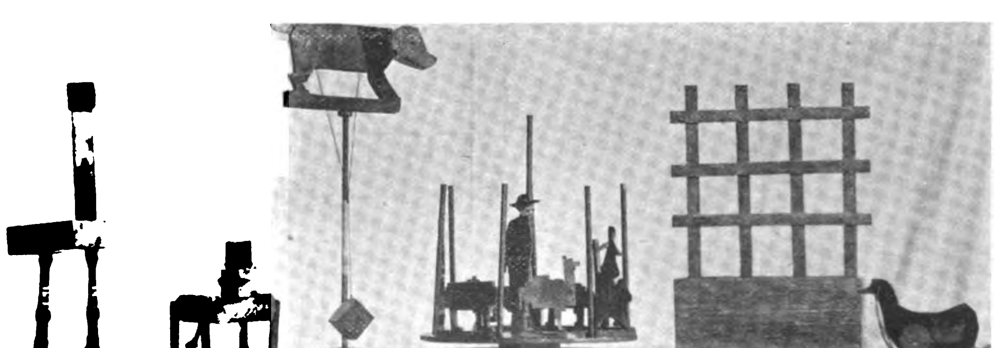
The actual service operating time of announcing of the returns and of plays of the eight games was about fourteen hours. It was found that the project was related very closely to other types of ordinary classwork and shopwork, and aside from the actual operation of the bulletin board and the directing of the crowd, the activities involved were common to the every day school shopwork.

The difficulties of the project were few and so far as could be learned the only draw-back was the fact that the games began at 2:05 p. m. and the school session closed at 2:30 p. m. This handicap was overcome satisfactorily by combining the earlier returns to the practical arts shops, where the receiving apparatus was installed, until the end of the afternoon session. The small illustration shows only a small part of the large crowd which gathered in the area of the school and followed the plays with intense interest.

SALARIES OF SUPERVISORS, OR DIRECTORS, IN 53 LARGE CITIES IN 1920-1921.

Compiled by Bertha Y. Hebb, U. S. Bureau of Education.

Cities	Art	Home Economics	Manual Training
Average	$2874	$2740	$3305
Akron, O.	2600	....	....
Albany, N. Y.	3200	....	2500
Atlanta, Ga.	....	....	....
Baltimore, Md.	2000	2000	2900
Birmingham, Ala.	2200	2500	2400
Boston, Mass.	....	2820	3540
Bridgeport, Conn.	2300	....	....
Cambridge, Mass.	3220	....	....
Chicago, Ill.	3750	4500	5000
Cincinnati, O.	3600	3200	3500
Cleveland, O.	3560	3560	3680
Columbus, O.	2625	2250	2250
Dallas, Tex.	3000	....	....
Dayton, O.	2050	2550	2550
Denver, Colo.	2590	2740	2940
Des Moines, Ia.	2412	2340	3400
Detroit, Mich.	4000	4000	4000
Fall River, Mass.	2880	2120	....
Houston, Tex.	2600	2100	2700
Indianapolis, Ind.	3500	2300	3500
Jersey City, N. J.	4100	4100	4100
Los Angeles, Calif.	3840	3840	3840
Milwaukee, Wis.	3840	3840	3840
Minneapolis, Minn.	2750	2500	3300
Nashville, Tenn.	1700	....	....
Newark, N. J.	2900	2900	3900
New Bedford, Mass.	2975	1850	2850
New Haven, Conn.	2750	1850	1900
New York, N. Y.	5500	5000	5500
Norfolk, Va.	1625	....	....
Oakland, Calif.	3060	3220	....
Omaha, Nebr.	2200	....	2700
Paterson, N. J.	2200	2200	2900
Philadelphia, Pa.	4510	....	4510
Pittsburgh, Pa.	4000	4000	3600
Reading, Pa.	1850	1500	2050
Richmond, Va.	1793	1793	2420
Rochester, N. Y.	3900	3600	3400
Salt Lake City, Utah	2800	2000	2600
San Antonio, Tex.	1950	....	....
Scranton, Pa.	1890	1890	....
Seattle, Wash.	3000	3660	3660
Spokane, Wash.	2550	2250	2250
Springfield, Mass.	3175	2700	....
St. Paul, Minn.	2600	2500	3500
Syracuse, N. Y.	2450	....	3600
Toledo, O.	2500	2200	3750
Trenton, N. J.	2350	2250	2900
Washington, D. C.	2740	2740	3020
Wilmington, Del.	2000	2000	....
Worcester, Mass.	3250	2000	3250
Youngstown, O.	2850	2250	2975



NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Sun Dial.

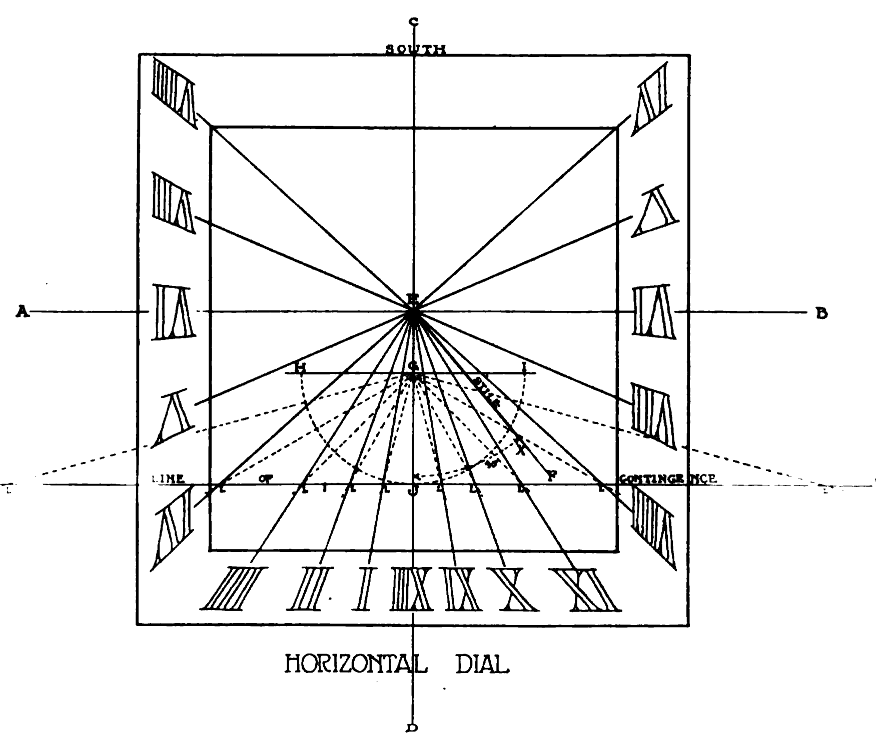
240. Q: Will you please give me directions for making the drawing of a horizontal sun dial? C. A. E.

A: The following directions for making the drawing for a sun dial taken from "The Time Piece of Shadows" by Henry Spencer Spachman. They are sufficiently complete for any manual training man to follow:

First, draw the line AB, and at right angles to it CD; then, from the point of intersection E, describe the quadrant BD, of any convenient radius. Set off on this quadrant from D toward B, marking with the dot x, the latitude of the place for which the dial is intended (in the example 40°). Draw through X, from E, the line EF, and the angle D E F will be that of the stile. Draw the line KK through CD at any convenient point, as J, parallel to AB, and as long as the paper will permit. This line is called the line of contingence, or touch line. Measure from the intersection J the least or perpendicular distance to the line EF, and set it off on the line CD, from J toward G. From the point G so found describe the semicircle H J I, with the radius JG. This is called the equinoctial circle. Draw the line HI through G and parallel to KK. Divide the semicircle HJI into twelve equal parts; place a ruler on each of these divisions and the center G; draw the lines GL and mark the points where the ruler touches the line KK; then from the center E draw through each of these points on KK the lines E5, E4, etc., which are the hour lines for the dial; AEB is always the 6 o'clock line, and CED the 12 noon lines. If the hours before 6 A. M. and after 6 P. M. are to be shown produce the lines for 7 and 8 A. M. and 4 and 5 P. M. backward through E for 7 and 8 P. M. and 4 and 5 A. M. Bound the whole with such lines as the taste may suggest, and figure the hours around the border where the lines cross. If half and quarter hours are to be shown the semicircle HG must be divided into twenty-four or forty-eight equal parts and the halves and quarters drawn through the divisions as were the hour lines. Subdivisions of five minutes may be made in the same way, but these as well as single minutes, can be accurately enough laid off around the border with the eye.

The stile must be placed directly over the 12 o'clock line, or sub-stile, CD, bending neither to the right nor left. The point of the angle starting from the centre E and opening toward the north, the upper edges forming the same angle with the dial plate as the line FF does with CD. The dial must be set in place perfectly level, with the stile line CD truly north and south. Only the hour lines should show on the finished dial, the others being erased. The stile should be either of metal or stone, wood being liable to warp. Usually, for neatness of appearance, the back of the stile is hollowed inward, but the upper edges which cast the shadow should be sharp and straight.

The following rules are applicable to all dials, and are stated here to avoid constant repetition:



HORIZONTAL DIAL

1. That the line of contingence should be made as long as the paper will permit.
2. That the line of contingence is always tangent to the equinoctial circle and at right angles to the sub-stile.
3. That when half or quarter hours are to be shown the equinoctial circle must be divided into twenty-four or forty-eight equal parts and the lines drawn through these divisions as for the hours. Subdivisions of one or five minutes can be set off around the border by the eye.
4. That the hour lines only and their subdivisions need be shown on the finished dial, the others being erased.
5. That the stile must be fixed on the plate at right angles—that is, bending neither to the right nor the left—and the upper edge that casts the shadow parallel to the polar axes of the earth, one end toward the north and the other toward the south pole.
6. The stile should be made either of metal or stone, wood being liable to warp. The dial plate may be of any convenient material.
7. That all vertical dials must be set in place so that the 6 o'clock lines will be parallel to the horizon—that is level—and the 12 o'clock line is always perpendicular.
8. It will generally be found more convenient to set off the latitude with a protractor, though it can readily be done in the following manner: Divide the quadrants into nine equal parts of ten degrees each; subdividing to single degrees that only through which the latitude passes. (Ex.—To set off 47° latitude: Take the first four of 10° each=40°; then by dividing the fifth into ten parts, the remaining seven degrees are easily seen in the cut.)
9. When the thickness of the gnomen exceeds one-sixteenth of an inch there must be an allowance made for it on the dial plate; the line CD in the drawing being widened to correspond to the thickness of the gnomen, one edge casting a shadow in the morning, the other afternoon. This is most readily done by supposing the drawing cut in half through the line CD, and each edge placed against the gnomen.

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